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THE UNIVERSITY OF TORONTO
MEDICAL JOURNAL

VOLUME XXVI TORONTO, MARCH, 1949 NUMBER 6

A SYMPOSIUM ON THE TERMINATION OF PREGNANCY[1]

INTRODUCTION

J. HEPBURN[2]

THE ARTICLES, comprising the symposium, to which this is an introduction, form a unique collection of the views of specialists in internal medicine, psychiatry, and obstetrics, together with the attitudes of the law and of the Roman Catholic Church (as expressed by a Roman Catholic physician).

Adequate comment on the various papers would entail far too lengthy an introduction and would necessitate stealing the thunder of the authors.

As far as physical diseases are concerned, the present day view of the internist is much more liberal than it was over twenty years ago when he was consulted by the woman contemplating pregnancy. On the other hand, his view is much more conservative in the case of the already pregnant woman.

Perhaps the most important fact that has emerged from work in Boston, Toronto and elsewhere is that pregnancy should never be terminated by caesarian section for heart disease alone.

The physician and above all the obstetrician should be sufficiently conversant with the facts to be able to tell the woman contemplating pregnancy and the already pregnant woman, what risk she has to face.

The woman with full knowledge and understanding of the risk, should be free to decide whether she is willing to take that risk in her eagerness to have a child of her own.

Each case should be considered on its own merits and it is the bounden duty of a physician not familiar with the risks to seek the advice of a physician who is.

It is perhaps a greater tragedy to advise against pregnancy when the risk to life or health is not prohibitive than to recommend pregnancy where the risk is great.

THE LAW OF ABORTION

K. G. GRAY[3]

In Canada, a criminal abortion is defined in Section 303 of the Criminal Code which reads as follows:

> "Everyone is guilty of an indictable offence and liable to imprisonment for life who, with intent to procure the miscarriage of any woman, whether she is or is not with child, unlawfully administers to her or causes to be taken by her any drug or other noxious thing, or unlawfully uses on her any instrument or other means whatsoever with the like intent."

[1]Originally presented at a Staff Meeting of the Medical Service of the Toronto General Hospital, Toronto, Ontario, 1948.

[2]Associate Professor of Medicine, University of Toronto.

[3]Special Lecturer in Medical Jurisprudence, University of Toronto.

In the interpretation of this section attention is particularly directed to the term "unlawfully."

The leading court decision is the case of the King *vs.* Bourne, 1939, 1 K.B. 687. The facts in this case were briefly as follows:

"On April 27th, 1938, the girl who was then under the age of 15 was raped, in consequence of which she became pregnant. The defendant, Mr. Bourne was an obstetrical surgeon at St. Mary's Hospital. With consent of the parents, Mr. Bourne aborted the girl without fee or reward, at the hospital. Mr. Bourne in his evidence stated that in his opinion the continuance of the pregnancy would probably cause serious injury to the girl; injury so serious as to justify the removal of the pregnancy. His evidence was supported by Lord Horder and also by Dr. J. R. Rees, a specialist in medical psychology. Dr. Rees expressed the view that if the girl gave birth to a child the consequence was likely to be that she would become a mental wreck.

The charge was laid under Section 58 of the Offences Against the Person Act, 1861. This is like our Section 303 of the Criminal Code."

The trial Judge interpreted the word "unlawfully" as meaning that the Crown must prove beyond reasonable doubt that the defendent did not procure the miscarriage of the girl in good faith for the purpose only of preserving her life.

The Judge also discussed what meaning is to be given to the words "for the purpose of preserving the life of the mother." He stated that life depends upon health and it may be that health is so gravely impaired that death results.

In his view, there is no clear line of distinction between danger to health and danger to life. Preserving the life of the mother does not mean merely saving the mother from instant death; the law does not require the doctor to wait until the unfortunate woman is in peril of immediate death.

The following quotation from the judgment sums the matter up:

"Here let me diverge for one moment to touch upon a matter that has been mentioned to you; the various views which are held with regard to this operation. Apparently there is a great difference of opinion even in the medical profession itself. Some there may be, for all I know, who hold the view that the fact that a woman desires the operation to be performed is sufficient justification for it. Well that is not the law; the desire of a woman to be relieved of her pregnancy is no justification at all for performing the operation. On the other hand, there are people who, from what are said to be religious reasons, object to the operation being performed under any circumstances. That is not the law either. On the contrary, a person who holds such an opinion ought not to be an obstetrical surgeon, for if a case arose where the life of the woman could be saved by performing the operation and the doctor refused to perform it because of his religious opinions and the woman died, he would be in grave peril of being brought before this court on a charge of manslaughter by negligence. He would have no better defence than a person who, again for some religious reason, refused to call in a doctor to attend his sick child, where a doctor could have been called in and the life of the child could have been saved. I mention these two extreme views merely to show that the law lies between them; it permits the termination of pregnancy for the purpose of preserving the life of the mother.

As I have said I think those words ought to be construed in a reasonable sense, and if the doctor is of the opinion, on reasonable grounds and with adequate knowledge, that the probable consequence of the continuance of the pregnancy will be to make the woman a physical or mental wreck, the jury are quite entitled to take the view that the doctor who, under those circumstances and in that honest belief, operates, is operating for the purpose of preserving the life of the mother."

In the Bourne case the defendant was found NOT GUILTY. As a result of this case it may be said that an abortion is not unlawful when it is performed for the purpose of preserving the life of the mother or where it is necessary in order to prevent serious impairment of her health.

THE TERMINATION OF PREGNANCY

H. B. Van Wyck[4]

It need not be stressed to this audience that the artificial termination of a previable pregnancy is the gravest decision that one human being is called upon to make for another. The law recognizes this in laying down the indications which justify the destruction of fetal life. As we have heard, it is through judicial pronouncement and not through statutory definition that we are enabled lawfully to terminate a non-viable pregnancy if it is necessary to do so to "preserve life," and we know that this is also more widely interpreted to mean "to prevent serious impairment of her health."

Of these two indications which, apart from ethical consideration, justify therapeutic abortion in the eyes of the law—the preservation of maternal life and the prevention of serious impairment of maternal health—the first is difficult to apply with exactitude because the judgment that a maternal life is the alternative to an abortion is at best only an opinion which, although supported by experience and sincere conviction may at times be mistaken. On the other hand, the opinion that maternal health will be seriously impaired even if based on sound statistical and clinical basis, may be refuted by the event.

Thus, there is no escaping the conclusion that the decision to terminate pregnancy may be of necessity based on grounds not always exact or infallible, but it seems ethically sound to most of us to find justification for abortion in the preservation of maternal life and this concept seems naturally to include the prevention of serious impairment of health. On such grounds, we, as physicians, are prepared to act, provided that the decision is made in conference after deliberation adequate to the seriousness of the decision to be made.

So much is accepted, but what of the other reasons which can be advanced with a special appeal to the pity, humanity, and generosity of the physician. I refer to social and economic grounds. Can the domestic or economic background ever justify abortion? Should anyone think so, let him tell us at what level of income a fetus is permitted to live and below what level to die. This *reductio ad absurdum* is pertinent whenever the economic factor is brought forward. One could not be indifferent to the lot of the invalid, underprivileged mother with too many children. This, however, is not the prime responsibility of the physician to the point of justifying the destruction of life. It is a matter for the state to readjust the economic factor at fault.

Termination of pregnancy is often advocated on other grounds equally inexact and fallacious, such as the aggravation of otosclerosis already present, the statistical probability of the child being deaf or dumb after maternal measles early in the pregnancy, or an even greater statistical probability of erythroblastosis fetalis in certain cases. Such indications as these are not justifiable in my eyes on two counts, because (*a*) they do not involve maternal chances of survival and (*b*) although the statistical probability of a tragic result is great, exceptions that seem to break all rules do occur.

Another question involves the implication that the health designated in the legal sense means health both physical and mental. Most of us, perhaps all

[4]Professor of Obstetrics and Gynecology and Head of the Department, University of Toronto.

of us, are prepared to believe that in relationship to the problem of abortion health includes both concepts, and obstetricians must rely on the combined opinion of the psychiatrist and the family doctor; but one cannot refrain from the comment that unless the medical attendants are efficient and conscientious to the highest degree, it should be possible for a shrewd malingerer to succeed in obtaining an abortion on specious psychiatric indications.

One may divide the conditions in which the problem of termination arises by two criteria: (*a*) the duration of pregnancy, and (*b*) whether the condition arises as primarily due to the pregnancy or as incidental to it. The duration factor involves the method of the termination which varies naturally with the term of gestation.

During the first trimester, early abortion may be carried out by a one stage vaginal operation. It is noteworthy, however, that in early abortion, with the exception of pernicious vomiting, the indications are almost always for maternal conditions that pre-existed conception and in these, efficient contraception or sterilization would have been preferred procedures.

From the fourth month until the cervix is ripe—that is, prepared by shortening, softening, and dilatation—the simple method of rupture of the membranes is an induction that may fail to induce promptly enough. When this latent waiting period is of clinical importance, and it usually is, abdominal hysterotomy, in spite of the hazards inherent in any laparotomy, is often the procedure of choice. When chosen it affords opportunity for sterilization should this be indicated; but, it is a sound obstetrical principle that the advisability of sterilization must not be the determining factor in the election of the abdominal operation for termination.

The term of the pregnancy involves another important aspect of this problem. If the child is developed to its twenty-eighth week, in other words, is viable, the problem is radically different, inasmuch as termination does not now necessarily involve the loss of fetal life. The hazards of prematurity must always be considered although these rapidly lessen as term approaches.

The indications may be also divided into the groups of entities primarily due to the pregnancy and those incidental to it. The first group comprise the toxemias, the hemorrhages and the diseases of the ovum. In this group, the obstetrician, because of his greater experience with these entities, must bear the major responsibility in the decision for termination. In the albuminuric hypertension group of toxemias, however, are included renal disease and hypertensive disease. Their inclusion is hardly logical because they usually pre-exist the pregnancy, but such inclusion is convenient for three reasons: (*a*) the differential diagnosis between hypertensive renal disease and pre-eclampsia is often difficult, even impossible at times, without exact knowledge of both the past and future history of the patient; (*b*) the treatments are substantially the same in principle; and (*c*) the aggravation of each by the continuing pregnancy is a clinical phenomenon which the obstetrician is trained and competent to follow by repeated experience and by his knowledge of the metabolism of pregnancy. However, in these conditions, especially as even primary eclamptic toxemia may initiate secondary renal or hypertensive disease, the obstetrician and internist must both contribute to a

decision upon which the patient's safety and future depend.

As eclamptic toxemia will not be discussed further at this time, one may note two tendencies in treatment that have developed in the past decade. The first is that pre-eclampsia, even if of comparatively moderate degree, should not be treated more than a few weeks because it would appear that even in mild cases after three weeks, irreversible vascular changes may occur especially in the renal vessels. The second is that it has been statistically shown by Cosgrove that pre-eclampsia prolonged past the thirty-fourth or thirty-fifth week does not result in a greater fetal salvage. These two principles show the folly of hazarding the making of a renopath of the mother in an unsuccessful attempt to save the child.

Where uterine hemorrhage complicates the pregnancy, the problem is often solved by the spontaneous and natural onset of labour; but when this does not occur in the stage of early or pre-viavility, the risk of conservation on behalf of the child must be balanced against that of the mother. This is entirely an obstetrical problem, fortunately much easier to solve because of the increased availability of hospital facilities and, in particular, the availability of hospital blood bank service. Provided the patient with antepartum hemorrhage is in a modern hospital with an alert staff and a good blood bank it is apparent that much greater latitude is permissible in carrying these patients towards term than has heretofore been realized.

In the group of conditions not primarily due to pregnancy, but incidental to it—the diseases of the mind, heart, lung, kidney and diabetes mellitus—the obstetrician must rely on the specialized knowledge of his medical colleagues. The treatments of many of these conditions which formerly were aggravated by pregnancy have improved so much that they may be often now treated satisfactorily without interfering with the gestation. Although the fullest co-operation of obstetrician and physician is necessary for efficient pre-natal care, in these incidental diseases the physician must bear the greater responsibility when the problem of termination arises. These will now be discussed, but before we hear the next speakers, may an obstetrician make one last comment?

When the termination of pregnancy is to be carried out before the fetus is viable, the obstetrician is acutely conscious that no matter how urgent the indications and how much support he has from his medical colleagues, he is not only the direct agent of the cruel necessity but he himself has to face the risks to the mother always inherent in the operation. To this natural point of view he hopes his consultants will be understanding. While we respect and rely on the specialized knowledge and advice of internal medicine, we hope that our medical colleagues will realize that the problem presented to us, who have to act as the instruments, carries with it a still greater feeling of responsibility.

To restate the opening remarks of this short résumé: the performance of therapeutic abortion is the gravest function of the obstetrician.

CARDIAC INDICATIONS FOR THERAPEUTIC ABORTION

H. E. Rykert[5]

Heart disease in pregnancy is relatively infrequent and the cardiac constitutes less than two percent of obstetrical admissions to hospital. Thus, while by

[5]Assistant Professor of Medicine, University of Toronto.

no means a common problem, from time to time, the internist is faced with the question of whether or not, in a young woman with heart disease, pregnancy should be forbidden or, if pregnancy is established, should be interrupted. The decision must be based on the risk involved. If, on factual clinical evidence, continuation of pregnancy constitutes an unreasonable risk to the life of the patient, or if it unreasonably jeopardizes her future health, then consideration must be given to therapeutic abortion.

How do we determine if the risk is an unreasonable one? This question is answered by a consideration of the factors which permit decision as to the position or stage reached by the patient with respect to her heart disease. Generally speaking, the prognosis in terms of maternal mortality is reasonably good if pregnancy occurs at an early stage of the patient's heart disease and is bad in the late or terminal stage of that heart disease. To further illustrate this point, it is well to consider the natural history of rheumatic heart disease. Commonly, the initial event is an attack of acute rheumatic fever. Next may follow a period of a few years wherein the patient suffers rheumatic recurrences. Then, although as result of the acute attacks, the patient has chronic rheumatic heart disease, this may not significantly affect the functional capacity of the myocardium and the patient, experiencing no symptoms, is able to lead a perfectly normal life. It is during this third phase that the prognosis for the cardiac in pregnancy is usually good. In terms of prognosis this stage of good cardiac function must be distinguished from the terminal phase of the disease wherein functional capacity of the heart becomes limited and cardiac failure and other usual late manifestations of the disease make their appearance.

Heart disease in pregnancy in the majority of cases is rheumatic heart disease (see Table I). So infrequent are other forms of heart disease that for practical purposes the problem may be studied from the standpoint of rheumatic heart disease alone.

TABLE I

ETIOLOGY OF HEART DISEASE IN PREGNANCY

Etiology	Number of Cases	
	Hamilton	Henderson
Rheumatic	781	190
Congenital	28	7
Luetic (Cardiovascular)	2	0
Miscellaneous	39	3

For the purposes of discussion, clinical factors influencing decision as to the stage reached by the patient in her heart disease may be divided into two groups: those of major and those of minor importance. Factors of major importance are heart failure and serious disorders of rhythm. Factors of minor importance are exercise tolerance, size of heart, age and valvular disease. An important factor bearing on prognosis but not of assistance in determining the stage the patient has reached in the course of her disease is serious co-existing disease. An additional factor which merits consideration is economic status.

To clearly understand the importance of heart failure in the pregnant cardiac, brief reference must be made to certain changes in cardiovascular physiology which occur in normal pregnant women. It must be emphasized that the burden of pregnancy in both the normal patient and the patient with heart disease is not a static one. The circulatory burden of pregnancy, light in the early months, becomes maximum in the 8th to 9th

lunar month and then lightens gradually to term. The total blood volume, cardiac output and velocity of blood flow are all increased. As evidence of the magnitude of these changes the plasma volume increases sixty-five per-cent and the total blood volume, forty-five per cent over normal non-pregnant values. As might be anticipated, the incidence of heart failure mounts as the circulatory burden increases, it becomes maximum at the period of peak load and then declines to term. Being mindful of these facts, two points become clear: (*a*) if heart failure has occurred in the normal state, the patient has reached a late stage of her disease and the prognosis is poor, and pregnancy will result in her death or serious deterioration of her cardiac status; and (*b*) if unprovoked heart failure appears during the early months of pregnancy, it may be expected to become steadily worse until the circulatory burden reaches its maximum and improvement is unlikely to occur until the burden diminishes in the final weeks of pregnancy.

Serious cardiac arrhythmias such as auricular fibrillation and auricular flutter adversely affect maternal mortality. Patients who have established or paroxysmal auricular fibrillation have a high mortality rate in pregnancy. Hamilton places the figure at thirty-three and a third percent and Bramwell at twenty-eight percent. For such patients, pregnancy carries an unreasonable risk. The occurrence of fibrillation, like heart failure, indicates an advanced stage of disease.

The exercise tolerance is commonly used as a guide to prognosis. Henderson and others have used functional capacity to classify their cases. There is a co-relation between exercise tolerance and occurrence of failure. A poor or bad exercise tolerance prior to or in the early months of pregnancy makes the occurrence of heart failure more likely. Because the burden of pregnancy is not a constant one, valid objection may be taken to a functional classification of cases. A good exercise tolerance in early months is not proof that the patient's capacity for effort will remain satisfactory when the circulatory burden reaches its maximum. In addition, functional capacity is difficult to establish with exactitude. Experience has shown that the care the patient receives during pregnancy is of greater importance than the exercise tolerance, provided the patient remains within her tolerance.

Cardiac enlargement was regarded by Hunt and others as a sign of great significance. It is now generally agreed that the size of the heart is of little value in determining a patient's course in pregnancy. Other things being equal, the pregnant cardiac with a slight cardiac enlargement has a better prognosis than a patient with gross cardiac enlargement. Obviously, the risk of failure is greater if the heart is considerably enlarged. However, absence of significant cardiac enlargement and a good prognosis do not go hand in hand and fatalities do occur in patients who have only a slight degree of cardiac enlargement.

Age and parity should be considered together. While rare, most rheumatic recurrences occur before the age of 23 years. After 35 years, the incidence of heart failure doubles. Thus, for the favourable cardiac, the safe period for child bearing lies between the ages of 23 and 35. On reviewing 340 cases of heart disease in pregnancy, Bramwell found the death rate in primipara (9%) almost twice that among multiparae (4.9%). These results were not in agreement with those of Hamilton and others who questioned that the risk

altered with any fixed number of pregnancies. With advancing years, cardiac status is likely to deteriorate and it is likely that it is this factor rather than parity which adversely affects maternal risk.

TABLE II

RELATION OF ENDOCARDIAL DISEASE TO MATERNAL MORTALITY

Endocardial Lesion	Incidence	
	Hamilton	Bramwell
Uncomplicated mitral stenosis	4.8% of 581 cases	7.7% of 260 cases
Uncomplicated aortic regurgitation	4.76% of 21	
Combined mitral stenosis and aortic regurgitation	5.2% of 116	3.2% of 31

The prognostic value of valvular lesions is much exaggerated. Maternal death rate is affected little by the form of valvular disease present. The combination of mitral stenosis and aortic insufficiency does not raise the maternal death rate significantly as compared to the death rate for uncomplicated mitral stenosis (see Table II). Early mitral stenosis or a slight degree of aortic insufficiency, theoretically and probably actually, gives a better prognosis than advanced lesions.

Pregnant cardiacs with serious co-existing disease such as chronic nephritis, diabetes mellitus, pulmonary tuberculosis or pre-eclampsia, as might be expected, have a relatively high mortality rate. The cardiac patient with pre-eclampsia has an unfavourable prognosis because the condition arises during the period of maximum circulatory stress.

In forming a prognosis for the pregnant cardiac, the social status and home environment merit examination. Given cardiac lesions of equal severity, how different may be the prognosis in the well-to-do as compared to the poverty stricken patient? Such minor factors as fatigue, effort in excess of tolerance, respiratory infection, insufficient rest, may and commonly do alter the cardiac status. Within a matter of hours, one or more of these factors may precipitate heart failure. Some pregnant cardiacs although entirely willing to accept the advice and treatment given are unable to do so by reason of their economic status. It is realized that legally the factor of home environment should not be considered in formulating an opinion with respect to termination of pregnancy; however, one finds it difficult not to take this factor into account in reaching a final decision.

To summarize, as Hamilton has done from the standpoint of prognosis, cases of heart disease in pregnancy may be divided into two groups; favourable and unfavourable, the unfavourable cardiac being defined as the patient who has reached a late stage of her heart disease and who has or has had heart failure, serious disorder of rhythm or significant co-existing disease. It has been shown that these patients run an unreasonable risk in becoming pregnant or when pregnant if the pregnancy is allowed to continue. Being mindful of the lesser factors influencing prognosis, all other cases may be included in the favourable group. The term favourable is used realizing that the most favourable cardiac runs ten times the risk, in terms of maternal mortality, that is incurred by the normal pregnant woman. Having assessed the cardiac status in the early months of pregnancy, we are thus in a position to advise continuance of pregnancy or termination because the risk appears to be an unreasonable one.

Obviously, we would do a great wrong in advising termination of pregnancy in, for example, an uncomplicated case of mitral stenosis. The patient, however, should be placed in full possession of the facts and have knowledge of the added risk that she runs. Thereby a basis for treatment is established, and the reason for following a strict regime made clear to the patient. If, on the basis of findings, it is our considered opinion that an unreasonable risk to life is entailed if pregnancy be allowed to continue, the facts similarly should be placed before the patient. If by reason of her religion or personal beliefs, she chooses to continue her pregnancy, we are not entitled to question her decision, even though in making that decision we believe she chooses death. There is no absolute indication for termination of pregnancy in any cardiac patient.

D. N. Henderson[6]

Dr. Rykert has outlined in a general way the indications and contra-indications for therapeutic abortion. I thought it would be of interest to present an analysis of our actual experience with this aspect of pregnancy and heart disease. In two hundred cases of heart disease, termination of pregnancy before the period of viability was performed in thirty. Each case was individually assessed by considering the past cardiac and obstetrical history, parity, and the present cardiac status of the patient. Twelve patients who had had cardiac failure before becoming pregnant or who developed it during the early months, had pregnancies terminated after recovery from the failure or when marked improvement in their general condition had occurred. Patients who had had cardiac failure or who developed it during the early months of pregnancy are very unlikely to stand the added burden of late pregnancy without another cardiac breakdown. In these twelve cases, therapeutic abortion seemed clearly indicated.

Seventeen patients had pregnancies terminated because of such marked impairment of exercise tolerances along with their evidence of severe heart disease, that it appeared that the added burden of late pregnancy would be greater than the heart could stand. The indications for termination in this group are by no means definite and are largely based on the experience of both cardiologist and obstetrician gained in the observation and management of a large number of pregnant patients suffering from heart disease. Each case was carefully considered and the problem discussed with the patient herself. Every effort was made to carry to term the primiparous patient even in the face of grave risk; whereas with the multiparous patient, the mother of two or more children, such risk was unjustified. Twenty of the thirty patients in whom pregnancy was terminated had two or more living children and only two were primiparous. One patient with severe myocarditis had pregnancy terminated during an acute attack of rheumatic fever.

Before concluding it should be emphasized that termination of pregnancy or the induction of premature labour because of heart disease is rarely justified after the twenty-eighth week. By this time the maximum burden of pregnancy on the heart has been reached and as the patient approaches term there is, as a

[6]Associate in Obstetrics and Gynecology, University of Toronto.

rule, a gradually lessening of the load on the heart accompanied by an improvement in the condition of the patient.

In reply to Dr. Hepburn's question regarding the role of cesarean section in heart disease, I can point out that we have now delivered one hundred and twenty-eight consecutive cases of heart disease and performed cesarean section on only three occasions, all for obstetrical indications. We do not believe that heart disease is an indication for cesarean section.

THE QUESTION OF THERAPEUTIC ABORTION IN PULMONARY TUBERCULOSIS

H. K. Detweiler[7]

I have been asked to discuss the indications for therapeutic abortion in cases of pulmonary disease complicated by pregnancy. This question really resolves itself into the problem of the pregnant tuberculous woman, as it has been my experience and, I think, the experience of others that interruption of pregnancy needs virtually never to be considered seriously in the course of other pulmonary diseases.

In no branch of medicine is it possible to find so many diverse opinions, each one supported by charts, tables, figures and percentages, as in this field of the management of the pregnant tuberculous patient. The truth about the influence of pregnancy on tuberculosis cannot be shown by combining statistics from different sources.

Many tuberculous women feel better during pregnancy, a fact that probably influenced Hippocrates to claim that pregnancy was good for tuberculosis. Sydenham and Rokitansky shared this view. Gradually it was borne in upon medical observers that, during the the puerperium, the condition of many of these women deteriorated rapidly and from about 1850 through to the early years of this century, under the leadership of the Germans, the tendency was to regard pregnancy as more or less regularly harmful and many authorities drew the natural, but unsubstantiated, conclusion that therapeutic abortion must be the most satisfactory treatment. During the past thirty years, the pendulum has swung back and now occupies a position more nearly approaching the neutral.

There is general agreement that pregnancy should be avoided in a tuberculous woman until the lesion has been inactive or quiescent for at least two years. Nevertheless, if a childless woman desires to risk all in an attempt to have a child, she should be allowed to do so. The course of action to be taken when an already pregnant woman is found to be tuberculous is more controversial. If, on careful study, the lesion is found to be inactive there are now not many who would advise against continuing to term. But activity itself is not necessarily sufficient reason for interrupting a pregnancy already started.

Why do so many tuberculous women do well during the period of gestation and why do a number of these do badly during the puerperium? We have no adequate answers to these questions. It is held by some that as the pregnancy progresses, the increased abdominal pressure raises the diaphragm and, in effect, splints the affected lung much as occurs in section of the phrenic nerve. After delivery, the diaphragm descends to its normal position and the lung is

[7]Associate Professor of Medicine, University of Toronto.

stretched to its normal dimensions before the healing favoured by the partial collapse is complete. This, they say, accounts for the clinical course so often observed.

On the other hand, it has been claimed by others, and with considerable investigative evidence, that, even during pregnancy, the vital capacity may be increased in spite of a high diaphragm, due to an increase in the depth of the thorax, a widening of the sub-costal angle, an increase in the circumference of the chest and a normal excursion of the diaphragm in spite of its high position. However, even where this increase in vital capacity occurs, it is relatively small.

In pregnancy, there is usually a large increase in pulmonary ventilation which, with a relatively slight increase in vital capacity, results in dyspnoea. The total blood volume is increased and the lungs share in this increase, which in turn excites the irritability of the Hering-Bruer reflex and contributes to the dyspnoea. Whether these physiological changes have an effect upon pulmonary tuberculosis is not clear at present.

Some observers feel that irrespective of known physiological and pathological factors, nature provides the pregnant woman with some mysterious force which enables her to withstand the burden of gestation, at least until the biological function of reproduction is attained, no matter what the outcome after the child is born. This has been observed not only in tuberculosis but also in diabetes and in victims of cancer.

What advice the physician should give when confronted with the problem of a tuberculous pregnant woman may best be presented by trimesters. During the first trimester, if the tuberculosis is inactive, there is, of course, no particular problem except that of meticulous supervision. If it is active, the patient must be watched carefully in a sanatorium or hospital, especially if cavities, recent x-ray changes, an increase in physical signs or loss of weight and strength have been observed. If the disease is rapidly progressive and the patient is toxic, interruption of the pregnancy probably should be advised. Fortunately, this extreme measure is rarely necessary. For example, in a representative series of 118 cases, abortion had to be resorted to in only 4 cases.

If the patient is seen for the first time during the second trimester, the pregnancy should not be interrupted. The patient should be treated in a sanatorium with rest, pneumothorax or other surgery if indicated, and any other measures applicable to the non-pregnant tuberculous patient.

During the third trimester, the pregnancy should be allowed to continue. The patient needs much care and attention, including sanatorium treatment and close obstetrical supervision. If, in spite of this, the tuberculosis becomes fulminating and the patient's life or the viability of the fetus is threatened, the pregnancy should be terminated by section. In this connection, it may be said that cesarean section is rarely indicated because of the tuberculosis itself.

If open tuberculosis exists in the mother, the child should be separated from her at birth and lactation must not be permitted. After the mother is discharged from hospital or sanatorium, domestic help and financial assistance in the home must be provided where necessary. This emphasizes the social aspects of the problem, which are outside the province of this paper.

Emphasis should also be placed upon the importance throughout the pregnancy of constant consultation between

phthisiologist and obstetrician. Furthermore, because the best prognosis depends on a careful evaluation of the chest lesion and the obstetrical problems involved, individualization must be ensured and rule-of-thumb management must be avoided.

It is commonly stated that the exudative type of pulmonary lesion is more favourable in pregnancy than the proliferative type but it is probable that the effective control of the disease is much more important than the type of the disease. Finally, it should be emphasized that if therapeutic abortion is to be employed at all, it should not be considered after the end of the third month, because after that time, it is at least as serious as delivery at full term and probably more so.

SOME CONSIDERATIONS GOVERNING THE TERMINATION OF PREGNANCY IN NEPHRITIS AND DIABETES

W. R. Campbell[8]

The problems presented by nephritis and diabetes have two aspects—immediate and remote. The remote considerations in these two diseases have certain aspects in common which may be discussed first. We have first to remember that in any case, the care of the infant, apart altogether from breast-feeding it, which I have no doubt should be prohibited entirely, will impose an added strain of several hundred calories per day on the metabolism of the mother, unless this duty can be delegated to others. Few of us will have any doubt that this increased metabolic load is a serious one in each of these diseases; a load which must be carefully weighed in the individual case in the light of our knowledge of the functional efficiency of the kidneys or pancreas of the patient.

In the case of nephritis no eugenic considerations arise because it is not an heritable disease. Diabetes, however, can be inherited. It is inherited as a Mendelian recessive characteristic with a tendency to earlier development of the condition in successive generations. If the husband is also diabetic, one hundred percent of the children will be diabetic; if non-diabetic and not a carrier of diabetogenic genes the children will be non-diabetics. However, it is estimated that twenty-five percent of the population are carriers and all children of diabetics will be carriers. The probability, however, of numerous successful pregnancies in a diabetic mother is not great and, because families of less than three children die out in three generations, the eugenic problem is not so serious as, at first, it might appear.

Both diabetics and nephritics are prone to develop arteriosclerosis as a result of their disease and this, with its accompanying injury to other elements of the circulatory system, impairs the remote prognosis of the mother. Because it is probably not inheritable, there is little likelihood of similar injury to the infant from a physical standpoint, but the sociological effect is possibly not so benign. Sociological factors such as the success of the marriage, the economic status of the family, the number of healthy children in the family, and the possibility that the mother may not live to bring up the family deserve much consideration. However, the decision to interrupt a pregnancy must never rest upon these more remote factors alone. They should be regarded only as additional elements when the decision rests

[8]Associate Professor of Medicine, University of Toronto.

on immediate danger to the life of the mother or on a high degree of improbability that the fetus will survive.

Passing now to the more immediate problems connected with the kidney and pregnancy, I have not, so far as I remember, encountered primary acute glomerulonephritis in the first trimester of pregnancy. Remembering that, even though severe, the tendency of acute glomerulonephritis is to get well and that, at this stage of pregnancy, the metabolic load is not great, one would be justified in adopting a conservative attitude in most cases unless complications associated with the pregnancy compelled immediate action. A delayed resolution of the nephritis or an acute nephritis arising in the later months of pregnancy would expose the patient to considerable danger and the first evidences of toxemia in such a patient, most carefully watched, would justify immediate measures to terminate the pregnancy. In the subacute progressive haemorrhagic form, the renal injury alone would necessitate immediate action. Many times, the patient with a more or less quiescent sub-chronic form of nephritis will carry through a pregnancy with little further permanent damage, though I believe that the risk of complications of pregnancy developing are considerably greater than in the normal patient and that she will require considerably more watching than the usual case. There is, of course, some danger of progression of the nephritis in the later stages of pregnancy and great care must be exercised on this account. As the patient approaches or enters the stage of renal insufficiency, the added effect of the pregnancy may readily exceed the functional capacity of the kidney and, therefore, the probability of toxemia of pregnancy justifies intervention at any stage of pregnancy where it is encountered for the safety of the mother who may otherwise have many years to live.

To the pregnant woman, pyelonephritis is a more serious menace in any of its stages. While, in suitable cases, a trial of modern antibiotics is perhaps justifiable in the earlier stages, as soon as the patient shows evidence of renal insufficiency, immediate termination of the pregnancy is imperative.

From the renal stand-point, malignant arteriolosclerosis in the pregnant woman is likewise serious. It should, however, be carefully differentiated from a relatively benign essential hypertension. Possibly, it may be justifiable to temporise in the phase where renal functional efficiency is high, always remembering that the progress of the disease is invariably rapid in women of child-bearing age. When it is evident that renal efficiency is becoming affected, no other conclusion than to terminate the pregnancy is warranted.

Glycosuria during pregnancy may result from many causes other than diabetes. Such glycosuria presents no problem in pregnancy save diagnosis. It is always benign. When true diabetes mellitus can be diagnosed, the outlook is not so favorable. Sometimes, diabetes arising during pregnancy is of a temporary character disappearing on parturition. Like other temporary diabetes, it should be adequately, even vigorously, treated lest progress occur but the pregnancy may be allowed to proceed unless unfavorable signs develop.

Pregnancy in a true diabetic and even most cases of diabetes arising during pregnancy is a different matter. It is true that pregnancy exerts no unfavorable influence upon the diabetes in some few cases, principally the milder ones

requiring no insulin to metabolize a liberal diet, and also in some adequately treated patients requiring insulin. Unfortunately, I cannot confirm the impression that pregnancy usually does not affect the carbohydrate tolerance of diabetic patients. Critical examination of their course compels an opinion far otherwise, the more so the more severe the diabetes. It is still with considerable misgiving that I learn that a diabetic woman is pregnant though modern treatment with diet and insulin has markedly improved the former prognosis as to survival of the pregnancy by the mother. This type of patient must be very carefully watched. Perhaps unrelenting vigilance and care may achieve a reasonably good result. Under less favorable conditions, the results are not so happy. Before insulin, the maternal mortality of pregnant diabetics was 30 percent. A reduction to 4-9 percent was a considerable advance but is still from six to nine times that of non-diabetic mothers. The average fetal mortality, until recently, has not been much improved, remaining at 25-40 percent. Toxemia of pregnancy occurs in 12 percent of diabetic mothers and, in them, eclampsia is sixteen times as common as in non-diabetics. A frequent complication of early pregnancy in diabetic mothers is a decrease in carbohydrate tolerance and acidosis. Later, an apparent increase in tolerance may appear partly because of the storage of food by the growing fetus and, in some cases, by excessive production of insulin by the fetus. Owing to the low threshold of excretion for sugar during pregnancy, it may be dangerous to push insulin to the point of abolishing glycosuria. More reliance is to be placed upon the fasting blood sugar levels.

Besides an increase in the number of congenital defects of the fetus, polyhydramnios is encountered more frequently in the diabetic, especially in patients not under careful control. Stillbirths and abortion are also much more frequent and death of the child at birth due to hypoglycemia and asphyxia may also occur.

Thus, it is to be seen that the risks of pregnancy to diabetic mothers and their offspring are both great and numerous and the care of such patients most exacting. If, at any stage, despite care, the maternal risk becomes too great, or if adequate care cannot be accomplished, termination of pregnancy becomes our only recourse to save the life of the mother. Because of the high proportion of deaths *in utero* near term and consequent damage to both mother and fetus, caesarian section three weeks before term is the method of choice of delivery. An exhausting labor in a diabetic mother, who was perhaps in part dependent on fetal insulin, predisposes to acidosis but may thus be avoided or at least minimized. Such patients, however, require the same attention as other post-operative diabetics. Caesarian section at this time may be avoided in a comparatively small proportion of cases, usually multiparae, when the "ripeness" of the cervix promises the initiation of a prompt and easy labor by rupturing the membranes.

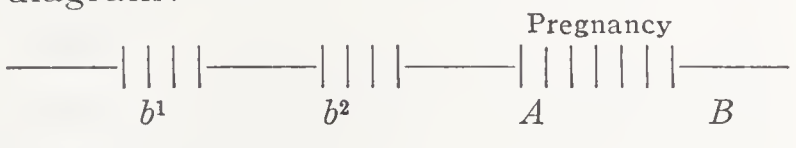
The newborn is placed in an oxygen incubator and 5 cc. of 10% glucose injected into each buttock. Feeding with glucose is attempted within four hours and repeated every two hours. If not retained, glucose must be injected intramuscularly at intervals for as long as 48 hours, if necessary. The child must be under continuous observation for at least three days and glucose and oxygen supplied as needed.

THE PSYCHIATRIC INDICATIONS FOR TERMINATING PREGNANCY

A. B. Stokes[9]

No one would wish more than myself to present you with clear cut indications for terminating pregnancy on psychiatric grounds, but it must be conceded at the outset that a psychiatric judgment on the termination of pregnancy is more arbitrary than any decision based on organic pathology. Each psychiatric case embraces a complexity of responses ranging from disturbances of organ function, through personality upset, to an unhealthy social attitude. All these are inextricably interwoven into a highly individual pattern.

Reduced to its simplest terms, the psychiatric problem is similar to that which obtains in other fields of medical practice and is represented by the diagram:



At point *A*, the life development of the patient includes a pregnancy. Because of some nervous or mental disturbance the psychiatrist must estimate then, what the position in respect to life or mental health will be at *B* if the pregnancy is allowed to go to term. He will require to know all he can about the total human functioning up to the pregnancy and of the total human circumstances then obtaining. He may be helped a little by evidence relating to past pregnancies, if any, and by the patient's condition at b^1 and b^2, but be as careful as he may in getting his history, seeking information wherever possible, nonetheless the facts available to him are of a different order of evidence to that which obtains in other medical fields and quantitative data are few. Even at the time of his personal examination, almost no measurement techniques are available to the psychiatrist and he is thrown back on the quality of his clinical and human experience.

Another difficulty, of which the psychiatrist bears the main brunt, is the inclusion in the patient's mental state of moral and ethical attitudes. The psychiatrist must be continuously correcting his own bias at this level of judgment. The wilful, self-centred woman who has led an erratic stormy life, who rejects the idea of motherhood and threatens suicide unless she is aborted, illustrates the dilemma. The decision might be "to protect this woman from a very real risk of suicide, the pregnancy should be terminated" or contrariwise "this woman will make much of the inconvenience of pregnancy; following it she will be no worse off in mental health than formerly; pregnancy should not be terminated despite the suicidal threat." The observer's judgment is weighted here by his moral attitude to suicide on the one hand and blackmail on the other.

It might be thought that the law as a definite social code would solve the difficulty. In England, in the Bourne case, "to save the mother's life" was interpreted as "to save the mother's health" and health included mental as well as physical well being. But following this interpretation a spate of psychopathic women, some with legitimate and others with illegitimate pregnancies, were referred by general practitioners to the psychiatrist because of not wanting the child and the supposed mental ill health which would attend an unrelieved pregnancy. The widening of the law in England at any rate has imposed an even greater arbitrariness on the psychiatrist's decision.

[9]Professor of Psychiatry and Head of the Department, University of Toronto.

There is a further general condition which is perhaps unique to psychiatry. Not only must the psychiatrist consider what he is relieving in recommending termination of pregnancy, but he must consider what he might be precipitating by such a recommendation. Occasionally, perhaps, in a woman of scrupulous obsessional kind, the termination of pregnancy later produces a severe depressive reaction with self-incrimination and suicidal risk.

It is to be noted that the psychiatric decision is most frequently required in early pregnancy usually at the end of the second month. It is at this time that the patient's apprehensions in respect to the future and fears in respect to the past with added "not wanting" attitudes are at their maximum. In contrast, the florid mental disturbances associated with pregnancy usually occur in the last month of gestation or the first month of the puerperium. When a florid mental illness occurs in the mid-months of pregnancy, the illness is likely to be of schizophrenic kind carrying a poor prognosis. To that extent decision in favour of termination is heavily weighted.

In the early months of pregnancy the cases presenting to the psychiatrist may be artifically divided for the purposes of presentation into three groups: (*a*) psychosomatic, (*b*) personality disturbance, (*c*) social difficulty.

Of the psychosomatic disturbances, the ones most seriously raising the problem of termination have in my experience been vomiting, chorea and asthma. These, in mild or moderate degree, can usually be carried, but in their severer forms with treatment limited by time and prejudiced by situational pressures, termination is the only recourse. Subsequent psychiatric treatment, however, may offer a chance of a later successful pregnancy. It is clear that a decision in the psychosomatic case is made on the effects of the physical symptom and the unlikelihood of a treatment program reducing these effects in time.

Of the personality disturbances, the whole gamut may present in the early months of pregnancy. Where the psychoses are concerned, the problem is usually posed in preventive form, namely "shall termination be brought about now to prevent what has happened in the past?" Each case will be judged in terms of all the factors involved but the nature of the past illness will weight the final decision. Where the past illness was a depression or elation the pregnancy might be allowed to go to term particularly when electrical convulsive therapy is available. Where the past illness was a toxic exhaustive psychosis, it was linked with the physical state at that time and if the physical state is now good, to that extent abortion would not be advised. Where a schizophrenic illness is concerned, unless there are exceptional offsetting circumstances, termination would be advised with sterilization.

Anxiety states and hysterical reactions, so long as any associated somatic disturbance is under control, would not ordinarily raise the problem of abortion, but, sometimes, obsessional states raise particular difficulty. There may be a long continued fear of harming the expected child when born by smothering or strangling or the like. When associated with obsessional compulsive acts, the patient's fear and family fears become cumulative. Nonetheless, by cooperation between the psychiatrist and obstetrician, such cases can be carried to term and beyond without harm. The alternative of terminating, as has been

indicated, might well be disastrous in terms of the patient's mental health.

In some instances the psychiatric problem presents in terms of social load. Rape, or forced intercourse as an indictable offense, or forced intercourse within the marriage situation, as with a sadistic husband, might well be associated with social circumstances of intolerable consequence to the patient in terms of mental health. Where pregnancy supervenes, the mental disturbance is worsened to a degree in which abortion as an alleviation would be justified. In England, at any rate, termination would be justified on psychiatric grounds always supposing that the facts are clear and not in doubt. When a certified mental defective becomes pregnant, which in England implies an indictable offense on the part of the man, a similar decision might be less justified.

One other way in which the social load not infrequently presents is the instance of a woman strained to the limit of her mental endurance by quickly repeated pregnancies sustained in a wholly impoverished setting of material and personal inadequacies. Here again, considerable judgment is required in the light of all the facts but sometimes the case appears overwhelmingly decided with resort to termination and sterilization.

From what has been said, it is apparent that the psychiatric approach to this field must continue to be a whole approach. Each case must be decided in respect to a very individual pattern of response with all possible facts available. Even with the utmost discipline, judgment will be difficult, and the difficulties will increase the more the problem impinges on the moral and ethical values of the patient.

ROMAN CATHOLIC VIEWS

E. F. J. Brooks[10]

Civil law recognizes that in full respect to considered medical opinion a pregnancy may be terminated for certain conditions of the mother, in order to save the mother. The adopted procedure, after such a decision, is a direct attack on the fetus which removes it from an environment in which it could survive to one in which it is unable to do so. The various indications leading to such a decision for induction have been fully discussed by other speakers and it will be seen that the position in which the medical man is placed is not an envious one. I have been asked to contribute to this discussion in view of the fact that our University fully realizes that it has not the desire to set a standard of teaching which may be contrary to the moral ethics of some of their students, nor do they wish that their graduates disregard the moral principles of their patients. A few remarks, then, seem to be in order on this subject from the standpoint of the teaching of Roman Catholic Theologians and others who observe the same teachings. In my most humble way then I am giving my own interpretation from knowledge of the facts as a Catholic physician and I feel confident that I am expressing the views of the Theologians.

I will be as concise as possible. The first point that must be remembered is that one cannot begin with the fetus. One must begin with the mother. One cannot take the fetus and remove it from an environment in which it cannot survive. There are examples, however, in which a pregnancy may be terminated at a time when the fetus may be viable. The period of viability is recognized as

[10]Associate Professor of Medicine, University of Toronto.

any time after twenty-eight weeks, and this may be altered to after the period of twenty-six weeks if the patient is in hospital with all the modern facilities, such as incubators, to facilitate the viability of the fetus. An induction is quite permissible after this time period by any method dictated by the obstetrician. This period of termination is applicable to such conditions as toxemia of pregnancy, eclampsia, malformation of the pelvis and cardiac conditions.

When the problem at hand is the question of the life of the mother, then one may use means to save the life of the mother, but then one says, this may bring about the death of the fetus. If there is no other means, it is permissible to act and this is the guiding fact I wish to stress, that is the principle of "double effect"—one is doing something which is good for the mother and if an undesirable effect is also attained it was not intended. I might here give examples where this principle is applied—the diagnosis is made of uterine cancer, or uterine fibroid, and the physician advises that surgery or radium is indicated and his opinion is to be respected and adopted. He is treating a lesion of the mother and his treatment is essential to her welfare, but if in so treating, it should be that the fetus suffers it was an undesirable second effect, but the act was indicated and permissible. The mother may be suffering from a medical condition such as malaria, hyperthyroidism, or myasthenia gravis, which require medical treatment in which the drugs used may be abortifacient, but Theologians tell us that if the mother must be treated in this way it is permissible and it is hoped that she may be benefitted and that abortion will not result. The above remarks alone are sufficient evidence that the Roman Catholic Church does not sacrifice the mother for the child, any indicated direct treatment of her condition is warranted but it is not permitted to deal directly with the fetus.

The question of dealing with ectopic gestation has been one of controversy but here moral law recognizes that such a condition of the tubes is a pathological one and as such may be removed, and the removal of the fetus in this instance is comparable to its removal if contained in a cancerous uterus.

The physician's responsibility is great in certifying to the need of therapeutic abortion. In the past many therapeutic abortions had been ordered for conditions which in the light of accumulative experience have now proven to have been entirely unnecessary. Pernicious vomiting of pregnancy was a strong indication at one time, but our opinion in this regard has altered greatly. Therapeutic abortions were considered necessary in such neurological conditions as disseminated sclerosis and myasthenia gravis, but now we have altered our opinion entirely regarding these conditions as reasons for our certification.

I do hope that my points of presentation will be clearly understood. Catholic students and Catholic patients, and many others, have their moral principles established by two thousand years of teaching and it has been impressed upon them that the life of the mother is as paramount as the life of the child, that every means may be adopted to save the life of the mother but it is not approved that you make a direct attack on the fetus to destroy it in order to save the mother, but you are quite justified and, in fact, urged to treat and save the mother and at the same time try to save the fetus and, therefore, both.

CHILDHOOD DIABETES, PART I*

CALVIN EZRIN, 4T9

CHILDREN comprise approximately five percent of the diabetic population. Their prognosis is all the more serious the earlier they develop the disease, because, unlike adults, children have to complete their growth and development in the presence of a metabolic disturbance which handicaps the body's functions. Childhood diabetes, therefore, should be considered as a separate entity with its own standards of treatment. In addition to this important difference, diabetes in children usually has a more severe and acute onset and is more often complicated by ketosis than in adults, and it invariably requires increasing amounts of insulin for its control.

Before considering the clinical picture as seen in children, we propose to present some aspects of the physiology and pathogenesis of diabetes and with this as a background discuss the objectives of treatment.

PHYSIOLOGY AND PATHOGENESIS

For many years following the report of von Mering and Minkowski in 1889, that pancreatectomy in dogs produced a state resembling human diabetes, it was generally assumed that that disease was of purely pancreatic origin. This view received further support from the discovery, by Banting and Best, of insulin and its effectiveness in the control of diabetes provided a proper diet was supplied. However, it was known clinically that hyperglycemia and glycosuria occurred commonly in conditions involving other organs, particularly pituitary and adrenal tumours and Graves' disease. The significance of these observations has now been indicated by the physiologists. Houssay (1) first demonstrated the importance of the anterior pituitary in carbohydrate metabolism, and Young (2) produced permanent diabetes in dogs by the prolonged administration of anterior pituitary extract. This was accompanied by characteristic lesions in the pancreatic islets, namely, a progressive loss of granulation leading to hydropic degeneration and eventual atrophy of the beta cells. In animals with reduced pancreases, administration of extracts of adrenal cortex (3, 4) and of thyroid (5) has since been shown to be capable of inducing diabetes. Recently, Lukens and Dohan (6) produced permanent diabetes in cats by the daily intraperitoneal injection of glucose for several weeks. This suggests that, in animals, the excessive activity of the anterior pituitary, adrenal cortex or, to a lesser extent, the thyroid may, by increasing the formation of glucose and by inhibiting its utilization, cause hyperglycemia of such degree as to overstimulate the pancreas. Thus permanent diabetes may result from overwork atrophy of the beta cells. Alloxan produces a selective destruction of the beta cells followed by typical clinical diabetes (7). It is evident that whenever diabetes is artificially induced in animals the pancreas is somehow involved, either primarily as in the case of alloxan or secondary to other conditions, the most constant of which is hyperglycemia.

The role of the pancreas in the production of spontaneous human diabetes

*Adapted from a paper of the same title presented before the meeting of the Alpha Chapter of Ontario of Alpha Omega Alpha, February 9, 1948.

is more difficult to evaluate. A considerable proportion of human cases at autopsy show insufficient involvement of the islets to explain the disease. However, there is about an equal number of cases in which definite islet lesions are demonstrable, and it is possible that with more specific stains, defects in the beta cells or a reduction in the number of islets will be found in a higher percentage of cases. Furthermore, the diabetic state can be brought back to normal by the administration of the pancreatic islet secretion, insulin. In fact, diabetes can be defined as a condition resulting from a relative deficiency of insulin; insulin secretion may be normal or even increased yet inadequate under the circumstances for the organism's needs.

Clinically, it is often seen that in adult patients coming under treatment for the first time, the maintenance of a relatively normal blood sugar level leads to an increase in carbohydrate tolerance and a decrease in the insulin requirement. In childhood diabetes, strict control of the blood sugar at the outset results in a considerably lower insulin requirement than when the diabetes is indifferently or poorly controlled. This suggests that the pancreas is involved to some degree, though perhaps not exclusively, in at least a large percentage of patients with diabetes mellitus, for these clinical improvements probably have as their basis a regeneration of damaged islet tissue, and restoration of some endogenous insulin producing capacity. Thus, the attractive possibility of a cure presents itself. If one could discover the disease early enough in a child and, by vigorous treatment with procedures tending to rest the pancreas and to change the not-yet-irreversibly hydropic islets to normal ones, the disease might be stopped in its earliest stages. Haist, Campbell and Best (1940) have even suggested the experimental prophylactic use of insulin in families with a marked hereditary disposition to diabetes (8).

It is well to remember that prevention is one thing, and treatment of established diabetes another. There exists a certain amount of confusion in the literature with regard to this point. We have found that certain conditions increase the need for insulin and thus increase the work of the islet cells of the pancreas. If we are interested in preserving islet cells, we could abolish those factors increasing the need for insulin, and not only prevent the development of diabetes but even in the established diabetic we could thus modify the diabetic state. If this is our object then the establishment of thorough control of the diabetes at the earliest possible moment and the maintenance of that state insofar as is possible should be our goal in treatment. The under-nutrition therapy of the pre-insulin era, the high-fat-low-carbohydrate diets, and the strict control of the blood sugar level, all have as their basis the desire to save the pancreas. For the moment, let us disregard prevention and consider the diabetes as established. What shall be our criteria for adequacy of treatment? Is the pancreas going to be our major consideration with all our efforts directed toward preserving undamaged islet cells, and restoring those that may still be saved to full functional capacity? Or shall we decide at the outset that, because this child is never to be anything but diabetic, we can neglect the factors affecting the insulinogenic function of the pancreas and depend entirely on exogenous insulin for the patient's supply. What shall be our guide if not the preservation of the islets?

Two criteria are of great importance. These are (*a*) the maintenance of the general nutritional state of the patient, and (*b*) the absence of early and late complications. Children need adequate provision for growth and development. The diets provided during the pre-insulin era, for example, were wholly inadequate for growing children who cannot thrive on a negative nitrogen balance. The prevention of early and late complications is without a doubt the most important problem at present confronting those concerned with the management of diabetics particularly those developing the disease in childhood. What relation has the level of control to the incidence of degenerative complications? This point will be considered most fully presently, but it can bear some stressing. The emphasis on complications does not mean that the possible benefits to the pancreas of treatment should be neglected. However, not only the possibility of improvement but also its limitations should be carefully appraised. Children must not be made behaviour problems because of their treatment. Several authors have emphasized the improvement of diabetes in children that accrues from early intensive treatment. Brush (9) reported on 39 children treated by large, frequent doses of insulin, all but 4 of whom, within six weeks, had so improved that they required less than 10 units of insulin per day. When energetic treatment is delayed, the response is less favourable. But juvenile diabetes tends to be severe and, within a few years after the onset of symptoms, most patients usually require more than 30 units of insulin per day, many of them far more, regardless of the methods by which they are treated in the early months after the onset. Thus we see that even prompt institution of measures designed to save the pancreas does not modify the long term result in children.

SYMPTOMS AND DIAGNOSIS

In children the onset of symptoms is usually rapid, in contrast to the insidious onset seen in adults. The disease is often first recognized in the younger age group (especially under 5) when the child is in acidosis or coma. Grishaw, West and Smith (10), found that in a group of 275 cases, approximately 40% had rather severe ketosis, and 20% were in coma at the time the diagnosis was made. In older children, the symptoms are classical in most cases. The most frequently reported are polyuria, polydipsia, polyphagia and loss of weight and strength. Many children are brought to the physician because, despite a great "improvement" in appetite, they fail to gain weight. Pruritus is a frequent symptom and infections of the skin, visual changes, personality disorders, mental confusion and failure in school are common complaints. The history, besides an enquiry into symptoms, should include a careful family history, because the hereditary factor can be demonstrated more frequently in young than in adult diabetics. The most plausible explanation is that the potentiality for the development of the disease is transmitted as a Mendelian recessive factor.

At the onset of symptoms, physical examination of the diabetic child shows advanced growth with bone and dental development about 18 months ahead of the chronological age, but if the disease is not treated adequately enough to allow for utilization of the dietary intake, the diabetic process leads to retarded development, and these children are then found to be shorter and stouter

than the children of a similar age group in the general population. Diabetic children who have had the disease for many years may develop skin complications such as xanthosis and xanthoma diabeticorum. Hepatomegaly and splenomegaly are not uncommon in poorly controlled cases. Both male and female diabetic children may exhibit precocious puberty and early development of secondary sex characteristics, suggesting a possible anterior pituitary overactivity as the precipitating factor.

Diagnosis in the child, as in the adult, rests on demonstration of two abnormal findings: hyperglycemia and glycosuria. In the urinalysis, a positive test for reducing sugars always demands that diabetes be considered likely until proven otherwise. However, it is important to rule out the melliturias with excretion of sugars other than glucose and the false tests due to non-sugar reducing substances which are encountered frequently, especially in the concentrated urine of young infants. A low renal threshold for glucose can be ruled out by blood sugar determinations. Brain tumour, severe infections, end stage nephritis, all may cause glycosuria in children.

Having found reducing sugar in the urine, the blood sugar level should be determined. A fasting blood sugar level above 130 mg. per 100 cc. (Folin-Wu method) or a post prandial level above 170 mg. per 100 cc. usually signifies diabetes. However, a glucose tolerance test should be performed if the fasting level is not above 150 mg. per 100 cc. and in all doubtful cases, because no child should be placed on dietary restrictions and insulin until the diagnosis is clearly established. In interpreting the results, a rise above 170 mg. per 100 cc. and a slow descent so that the normal level is not reached in 2 hours probably indicates diabetes, but if a glucose tolerance test is required, the child probably does not have diabetes. The child should be taken off insulin and given a full diet for 3 days before the test is done. Some children showing a diabetic curve only during the course of an infection become frankly diabetic at a later date. This observation is interesting, because John (11) suggests infection as a common precipitating cause of diabetes in childhood, many of his cases developing soon after some such illness. His explanation is that the infection brings to light the previously unsuspected hereditary weakness of the carbohydrate regulatory mechanism. In White's series, however, infection appeared to play no role in the development of the disease (12).

TREATMENT

Before the discovery of insulin, death occurred in about two years. In children, satisfactory regulation with diet alone is rarely possible. On this point, everyone treating children is in agreement, but there are differences of opinion regarding the necessity of strict control of the blood sugar level and the harmfulness of glycosuria. Essentially, there are three schools of thought: (*a*) the "strict control" group, who consider that the maintenance of normal blood sugar levels, regardless of the number of insulin injections necessary to obtain that state, is the only safe way of treating diabetic children; (*b*) the "free" group, who believe that children should be treated without any dietetic restrictions, and (*c*) the "middle of the road" group. The Hospital for Sick Children, Toronto, follows the middle course, as do John and White.

The principles of treatment at the Hospital for Sick Children are regulation of the diet, administration of insulin, and adjustment of exercise. Standards for treatment are normal blood sugar levels before meals, glycosuria only to the extent of less than 10% of the carbohydrate intake, no ketosis, freedom from symptoms, normal blood cholesterol levels, normal weight, and normal energy and happiness. The diet allows for adequate nutrition and supplies the needs for normal growth and development.

A simple and practical method based on the child's age is used for calculating not only the caloric requirements, but also the various constituents of the diet. As recommended by White, 1,000 Calories are allowed for a child 1 year old and 100 Calories are added for each year of age until the completion of growth. For girls, the total calories are limited to 2,200, as epiphyseal closure occurs at the menarche. Female adolescent obesity is then avoided by restricting the diet to 30-40 Calories per kilogram of the ideal weight for height and age. For boys, the maximum of 2,800 Calories is reached at 19 years of age. The composition of the diet is Carbohydrate 40%, Fat 40%, Protein 20%. For rapid calculation the carbohydrate is prescribed as 10% of the figure for total calories and the ratio of carbohydrate to fat to protein is 2:1:0.9. Although empirical, this method is very simple and effective. 30 grams of carbohydrate are subtracted from the total and divided into three snacks, mid-morning, mid-afternoon and before bed time. Of the remainder 1/5 is given for breakfast, and 2/5 each for the two remaining meals. It should be understood that this calculated diet is used only as a basic diet, and, often, is modified judiciously if the child's condition warrants it.

The initial dose of insulin varies with the age of the child as does the ratio of Toronto to protamine zinc insulin. At first, only Toronto insulin in three equal premeal doses is given in the following initial amounts for different age groups: 1-5 years, 10 units; 5-10 years, 20 units; 10-15 years, 30 units. Readjustments of dosage are made according to premeal tests of blood or urine. When the blood sugar is stabilized, usually within two or three days, a change is made to a combination of protamine zinc and regular insulin in the following ratios of protamine zinc insulin to Toronto insulin: 1-5 years, 1:1.5; 5-7 years, 1:1; and 7-15 years, 2:1. They are given at 7:30 a.m. with separate syringes. Breakfast is at 8:00 a.m. The urine is tested twice daily, at 7:30 a.m. and 4.30 p.m. If the morning specimen shows sugar, the protamine zinc insulin is increased. Toronto insulin is used to control hyperglycemia during the day.

Four complete alternate diets with substitution equivalents are supplied to the mother. A two-thirds light diet with the same insulin dosage is given in case of infection, which increases the insulin requirement but, because not so much food is taken, this roughly balances out. The discontinuance of insulin under these circumstances would soon have the child rushing towards coma. A two-thirds fluid diet for acute illnesses consists entirely of milk, orange juice or ginger ale.

The amount of exercise should be about the same each day and on days when activity is excessive, the urine is tested at bed time. If it contains no sugar an extra 10 gms. of carbohydrate are given to prevent a hypoglycemic reaction during the night. Psychological treatment, of great importance

at any age, is essential in children who feel left out of many activities and who rebel against what they consider unnecessary restrictions.

The strict control group, as exemplified by Jackson and Boyd (13) of Iowa City, feel very strongly that anything less than continuous absence of sugar from the urine compromises the child's welfare. They believe that if the child is kept constantly under physiologic levels of control, he will avoid the degenerative conditions and severe complications which, in their opinion, are attendant on "slipshod" methods of control. Their treatment consists of a rigid course of stabilization in hospital and the children are discharged only after being free from all shocks and glycosuria on a constant insulin dosage for at least ten days. The diet is carefully measured, fairly high in carbohydrate, with adequate protein and the rest in fat. Before the introduction of globin insulin (with its action midway between Toronto and protamine zinc insulin), they used four injections of Toronto insulin per day in order to maintain relative constancy of blood sugar, even waking the child in the middle of the night. At present, they use only three injections, globin insulin enabling them to omit the night dose. In response to anticipated criticism of this strict level of control on the grounds that the parents and child will revolt against such regimentation, they state that such is not the case and that this plan is both desirable and attainable. Once accumstomed to it, they believe it is much easier for the patient to follow than a less strict routine. More realistically, they admit that each patient finally reaches a state of compromise between that which is prescribed and that which his home environment makes possible. However, with the majority, it is claimed that the compromise is small if any. How this treatment affects the children psychologically will be discussed later. It will be sufficient to say here that Jackson and Boyd believe their young patients make a remarkable psychologic and social adjustment.

The method of control of Lichtenstein of Stockholm is representative of the "free" group who treat childhood diabetes without dietary restriction. In America, Tolstoi of New York treats his cases in this manner. The children receive a diet completely corresponding to that of their healthy playmates and enough insulin to produce a good general condition, a feeling of well being, a satisfactory increase in weight, a moderate amount of urine, and complete freedom from ketonuria. Lichtenstein prefers a moderate excretion of sugar on the grounds that this lessens the possibility of hypoglycemia and ketosis. Initial treatment is in the hospital where the children are allowed to eat their fill of the ordinary hospital diet. Here the amounts of food that the children consume spontaneously are weighed and measured. Later, in their homes, they are allowed the same diet as healthy children, even sugar and sweets in reasonable amounts are permitted, but no weighing or measuring of the food is required. Lichtenstein frankly points out that to obtain good results one must exercise a careful continuous control, through the medium of a diabetic outpatients department or home visits at regular intervals. His greatest stress is on the education of the mothers, teaching them to recognize in particular such changes in the child's condition as require a modification of insulin dosage. The "free" group claim that they produce psychologically well-balanced in-

dividuals who are not marked out from healthy children. Their growth in height and weight is said to be within normal limits and no difficulties are encountered during puberty. Joslin objects to this form of treatment on the grounds that it gives parents and children a false idea about the disease, namely, that it can be controlled by insulin alone and not by diet, insulin and exercise In his experience patients who have lived on free diets have been the ones most frequently admitted to hospital with coma or hypoglycemia.

Final judgment as to the best form of treatment awaits statistically sound follow up studies by these various groups. However, the majority opinion favours a routine similar to that followed by the Hospital for Sick Children.

Summary

We have considered some aspects of the etiology of diabetes, the role of the pancreas, pituitary, adrenal and thyroid glands, and have briefly outlined treatment of the juvenile diabetic as undertaken by different groups. While we recognize the importance of the pancreas in the diabetic state and the fact that insulin will relieve the condition, we feel that in determining what is adequate treatment for the established diabetic child, it is necessary to adopt criteria other than preservation of islet function. In conclusion, we submit that such criteria should include the maintenance of a nutritional state adequate for normal growth and development and the prevention of complications, both early and late.

ACKNOWLEDGEMENT

The author would like to express his appreciation to Dr. A. L. Chute and Dr. R. E. Haist for their valuable assistance in the preparation of this paper.

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PROGRESSIVE MUSCULAR ATROPHIES— A SUMMARY

ROBERT A. ARMSTRONG, 4T9

THE PROGRESSIVE muscular atrophies are disorders which occur secondarily to diseases of the spinal cord. Under this term we shall include: progressive muscular atrophy (of spinal origin), chronic anterior poliomyelitis, amyotrophic lateral sclerosis, syringomyelia, and "chronic bulbar palsy."

PROGRESSIVE MUSCULAR ATROPHY

Etiology: Unknown.

Incidence : Most commonly affects males in the middle-age group.

Pathology: There is degeneration of the anterior horn cells and slight degeneration of the pyramidal tracts.

Clinical Picture: Weakness and wasting begin insidiously, usually in the muscles of the hands, and spread to the forearms, arms, shoulder-girdles, trunk, and, ultimately, the legs. Fibrillation is usually prominent in the affected muscles. A flaccid paralysis results but the tendon reflexes usually remain normal. There is no sensory disturbance and no clinical evidence of the pyramidal tract degeneration. Rarely, it begins in the lower limbs.

The condition is usually very slowly progressive, having a marked tendency to remain stationary at any stage for years, and often requires 15-20 years to become distinctly disabling.

Prognosis: Life is not shortened and the disease may little affect the working ability of the patient because it seldom appears before middle-age and takes many years to become disabling.

Treatment: Purely symptomatic. A nourishing diet with a high vitamin intake may help retard the progress.

CHRONIC ANTERIOR POLIOMYELITIS

Etiology: This disease is unrelated to acute anterior poliomyelitis. It is sometimes seen in patients with syphilis, malaria, lead poisoning or chronic infections.

Pathology: There is a chronic, usually asymmetrical, degeneration of the anterior grey matter of the spinal cord.

Clinical Picture: The clinical picture is identical with that of progressive muscular atrophy, except that in certain syphilitic conditions, the tendon reflexes are lost.

Prognosis and Treatment: All suspected cases of progressive muscular atrophy should be carefully examined for an etiological agent because many show definite, and some complete, recovery following specific therapy for the cause.

AMYOTROPHIC LATERAL SCLEROSIS

Etiology: Unknown.

Incidence: Chiefly in males in the middle-age group.

Pathology: There is degeneration of the anterior horn cells, of the pyramidal tracts, often of the motor nuclei of the pons and medulla, and even of some of the pyramidal and Betz cells of the motor cortex.

Clinical Picture: There is an insidious onset of weakness and wasting of the small muscles of one or both hands which is generalized and accompanied by fibrillation. While both hands are ultimately involved, the wasting may be long confined to one limb. Fibrillation precedes the spread of the wasting up the limb to the shoulder-girdle; however the Latis-

simi and Serrati are involved late, and therefore there is no winging of the scapulae until the late stages of the disease.

There is subjective stiffness of the lower limbs, at first without objective proof, but ultimately the tendon reflexes become hypertonic. In some cases, stiffness of the lower limb and shaking (clonus) are the presenting symptoms. These cases are diagnosed as "pure lateral sclerosis" by some clinicians, but almost always muscle wasting is soon apparent indicating that this is merely a variant of amyotrophic lateral sclerosis.

In both upper and lower limbs, the tendon reflexes usually become increased, knee and ankle clonus and dorsiflexion plantar responses appear as the disease progresses. Sensibility remains unchanged, and the sphincters continue to function.

There is a tendency, in the late stages, for the disease to spread to the bulb leading to a slowly increasing dysarthria and dysphagia. Atrophy and fibrillation of the muscles of the tongue, cheeks, jaws, pharynx, larynx, and often the face develop. The excursion of the tongue, including protrusion, is limited, and the palate moves little on phonation. Thus swallowing is slow and difficult because the weak muscles of the tongue and floor of the mouth have difficulty in pushing the bolus of food into the pharynx, where weakness of the hyoids, non-fixation of the larynx (which can now move up and down) and the non-closing of the nasopharynx lead to regurgitation and aspiration of food. The patient cannot purse his lips or whistle, and the lips are often slightly open, allowing saliva to drool constantly from the mouth, macerating the skin of the chin. Ultimately, articulation is so ineffective that the patient can only make inarticulate sounds.

Amyotrophic Lateral Sclerosis has been known to begin in the bulb, the typical clinical picture appearing later.

Prognosis: The disease is slowly progressive, and death usually occurs 2-4 years after the onset, commonly due to aspiration pneumonia, or to asphyxia. Patients with bulbar involvement are exceedingly miserable.

Treatment: Purely symptomatic. Vitamin E is advocated by some (!). Tubal feeding and very careful nursing are necessary in bulbar cases.

SYRINGOMYELIA

Etiology: In some cases, it appears to be due to proliferation of embryonal cell rests of glial tissue in the central regions of the spinal cord with subsequent necrosis and cavitation, while in other cases, it is attributed to degeneration and cavitation within an astrocytoma of the cord.

Incidence: Both sexes are affected equally, and in the adolescent and early adult periods.

Pathology: There is cavitation of the spinal cord, either continuous or discontinuous. The walls of this cavity consist of dense glial tissue which compresses and destroys, in varying degree, the adjacent structures in the cord.

Clinical Picture: There is a characteristic "dissociated sensory loss," that is loss of pain and temperature sensibility while touch and pressure sensations are fully appreciated. This leads to the frequent finding of cigarette burns and other injuries on the patient's hands which he does not remember suffering. This sensory loss is often "suspended," seldom going below T5 or T6, and involves the arms and shoulders. There is weakness and wasting of the small muscles of the hand, which are bilateral but not necessarily symmetrical or equal. These spread up the arms to the shoulder

girdle accompanied by fibrillation. Trophic ulcers are common; numerous painless felons tend to develop. The hands become cold and cyanotic. Horner's Syndrome may appear due to involvement of the cervical sympathetic nerves. Arthropathies ressembling Charcot's joints may occur, especially in the upper limb.

When the disease spreads to involve the bulb (syringobulbia), there is disturbed sensation of the trigeminal nerve plus wasting and fibrillation of the tongue.

Rarely the disease begins in the lumbar region, when there is weakness and wasting of the foot muscles plus the characteristic sensory loss.

Prognosis: The disease is slowly progressive, leading to useless limbs and joints, but not necessarily shortening life.

Treatment: Particular care must be taken to avoid damage and infection to the hands. Deep x-ray therapy to shrink the cavity is advocated by many.

"CHRONIC BULBAR PALSY"

Etiology: Most cases of "chronic bulbar palsy" occur as the terminal state of amyotrophic lateral sclerosis, but some primary states do arise. Many of this group resemble progressive muscular atrophy (of the bulb) while others appear to be peripheral nerve lesions.

Incidence: Chiefly males in the middle-age group.

Clinical Picture: Identical with that of amyotrophic lateral sclerosis involving the bulb.

Prognosis and Treatment: Treatment is purely symptomatic. A few recoveries have been known from the primary condition, but never from that secondary to amyotrophic lateral sclerosis. Death usually occurs within a year or two due to aspiration pneumonia and asphyxiation.

DIFFERENTIAL DIAGNOSIS

These conditions can be differentiated readily by considering the anatomical basis of the objective findings. Progressive muscular atrophy and chronic anterior poliomyelitis give evidence of disease of the anterior horn cells only. Amyotrophic lateral sclerosis gives evidence of disease of the anterior horn cells and of the pyramidal tracts. Syringomyelia gives evidence of involvement of the anterior horn cells and the pyramidal tracts plus a characteristic dissociated sensory loss.

Pseudobulbar palsy is not accompanied by any muscular wasting, and often displays outbursts of inappropriate emotional reactions which do not represent the emotional state of the patient. Myasthenia gravis is not accompanied by muscular wasting, and the "paralysis" is relieved by rest. Thus both these conditions are easily differentiated from "chronic bulbar palsy."

ACKNOWLEDGEMENT

The author wishes to thank Professor E. A. Linell and Dr. R. G. Armour for their kind criticism and advice during the preparation of this paper.

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THE DOOR IS OPENING

GORDON WILSON, M.D., F.I.C.S. (A), 4T0*

PERHAPS THE PROUDEST, and yet inwardly the most disturbing moment in an undergraduate's life is Convocation. The glory of the moment but thinly masks the maelstrom of conflicting emotions, incident to leaving the shelter of his University, and passing through the opening door to his unknown future.

What shall I do? Specialize? Do general practice? Shall I settle in a small town, or a large city? Do group practice? Engage in single practice? Shall I marry soon or later? What postgraduate study shall I do? The list of self-imposed questions is endless, and it is in an effort to present some possible answers, that this article is written.

From the time they first enter Medical School, and until well past the time of graduation, the vast majority of students have but one goal—the day they first hang out their own shingle and open their first office—but, during the slow and sometimes tedious progress toward this goal, most students find themselves much like a bird dog, quartering for a scent. At one time, perhaps the practice of surgery appeals most strongly at another, the practice of gynecology and obstetrics; and at still another, the relative self-security of general practice. The problems of internal medicine may be very attractive to others, and yet, in a year or so their desires and interests may have entirely shifted to a different field of medicine. It is only a very fortunate and favoured few who go through the last two or three years of their medical course, with but one line of study and a future definitely in view.

In considering the complexity of modern general practice, this is not surprising. The increasing trend toward nationalization of medicine, appears to many sincere and thoughtful men, as a threat directed against the basic precepts of our medical careers. Yet the author does not believe that even the most astute student of medical economics can predict with any accuracy what the field of medicine will have to offer twenty or even ten years from now. This means, then, that medical men as a group, must remain and act as a group, in order that the privileges and standards of the physicians in Canada may not deteriorate. Membership and an active interest in the Canadian Medical Association is, therefore, the first prerequisite.

The case of specialization *versus* general practice has been heard *ad nauseam*, expressed by writers of far greater competence than the author. Nonetheless, there are a few basic considerations that one must evaluate before making even a tentative decision. Firstly, one must realize that the golden age of specialization has reached its full flowering, and is probably on the wane. In order to become an accredited specialist in any field of medicine, many great sacrifices must be made on the part of the student. One of these is marriage. In these days of costly living, it is almost impossible to support a family on even a senior resident's salary. Illness may come and ever mounting and overwhelming debt may terminate what might have been a brilliant career in a specialty. The second consideration is the inherent aptitude of the individual who contemplates a certain specialty. The author believes it is almost impossible for the average under-

*1607 Ellis Street, Kelowna, B.C.

graduate in medicine to predict, or decide with any accuracy, the type of work for which he is best equipped, both physically and tempermentally. To go even further, he feels it is a grave error for the average undergraduate to attempt this decision, because it will inevitably colour his reaction and receptiveness to instruction in fields other than the one which he has arbitrarily decided appeals most to him. The trite and well worn saying that "a specialist is a man who knows more and more about less and less" is, in general, regrettably true. It was the ill-conceived boast of a chief of surgery in a western hospital, that for thirty years he had never used a stethoscope. Unless the specialist is an exceptional person, he will have, almost certainly, lost much of "the human touch" in dealing with his patients.

At the other end of the picture is general practice. There is no question but that it takes a man of far greater ability to do good general practice, than it does to do good work in a specialty. The work is more arduous, and knowledge required is infinitely greater, but in the mind of the author, the rewards are without equal, and by reward is not meant monetary gain. In these days of high income tax, and high cost of living, it makes actually very little difference, whether a person earns $10,000 or $25,000 a year, because the net result is very close to being the same. The intimate relations of the general practitioner and his family of patients expresses probably the finest human relationship that exists. The general practitioner enters into the family. He knows their troubles, their illnesses, their problems, their domestic relations. He is consulted about a vast number of things besides those pertaining to medicine. His opinion is respected and he is regarded as a friend and a counsellor in fields far removed from those in which he was trained. These rewards are rarely met with by the specialist, who so frequently calculates his success upon the large number of cases he can assemble, or upon the large fees which he is able to charge, together with the social prominence that he may acquire through being a "specialist." It is becoming, more and more, the conviction of the author, that while the day of the specialist may to some extent be waning, that of the general practitioner, in its fullest extent, has actually yet to begin. In any scheme of national health insurance, no matter whether government or professionally sponsored, the basic unit in any such scheme will be the well-trained and competent general practitioner. This contention is borne out by the fact that recently, in the Canadian Medical Association, there has been established an individual Section of General Practice with the same standing and rating as any other Section of a specialty.

In considering his future, there are two basic questions that the undergraduate must ask himself before he goes any further. The first is, *what* do I *like* to do best? The second question is, *where* would I be *happiest* living? A man is happy only in doing what he genuinely likes to do. There are many unhappy people in this world, and their unhappiness is usually traceable to a mistake in a decision on one or both of the above questions. This may have been brought about by misfortune or chance, but it is usually due, in large measure, to a mistake in judgment, or mistaking prestige for sincerity. Some men are happiest in a city, others in a smaller centre, and still others in the country. The beauty of medicine in its practice, is that it matters little which of these are chosen, provided that the individual making the choice is certain that he will be most content in the place of his choice. Further,

he will be happy only if he is doing the type of work that he genuinely likes to do. It is vitally important that social or professional ambition or prestige should not enter into this decision. If basic aptitude, preservance and study, and enjoyment of one's work are combined, professional acclaim will come as a matter of course, no matter where one is situated.

Should one practise in a group or by oneself? The author has had experience in both, and for his part he would not trade the advantages of group practice against those of single practice. In a recent trip to the east, he was struck by the fact that extraordinarily few doctors had joined into groups, for the mutual betterment of themselves and the care of their own patients. There are definite, but rather limited advantages, to being what is so commonly referred to as "one's own boss"; but the truth of the matter is that he is the employee of his patients, to an extent that he will realize only after he has engaged in individual practice. The present and modern trend is, unquestionably, toward group practice, particularly in the smaller towns in the Western Provinces. The reasons for this change in the method of practice are numerous but need not be summarized at this time. However, one must appreciate the fact that there are several forms of group practice. The first of these is a four- or five-man practice, in which all the partners share equally in the net proceeds and, likewise, share in the responsibilities. It is usually wise for one member to be responsible for the administration of the internal workings of the group. It is, likewise, extremely valuable for the group to employ a Business Manager to look after the vast amount of detail work and accounting necessary for the efficient running of this group. Another type is one in which the doctors pursue their individual practices, but pool their resources and their accommodations, such as the use of a common waiting room, secretary, and laboratory facilities. The advantages of the first type of group practice are obvious. One is able to leave for post-graduate study, for holidays, or the like, without the worry of losing one's patients or the worry that one's patients will not be cared for. Regular periods of free time are made available for recreation or study. The sharing of responsibility lifts a heavy and onerous mantle of worry from the shoulders of the individual. In cases where a seriously ill patient is taxing the ability of the individual to the utmost, this burden may be shared and the opinion of his colleagues obtained freely and generously. It enables the formation of an operating room team of surgeon, assistant, and anesthetist, who become familiar with each other's idiosyncrasies and work together for the betterment of the patient. It affords the individual members an opportunity to pursue, what might loosely be called, their medical hobbies, and, while still maintaining a basis of general practice, become proficient in the line of work which appeals most to them and for which they are best fitted. The disadvantages are, of course, essentially ones arising out of differences of temperament. In order to enter a group practice, or engage successfully in group practice, one must learn to subordinate one's own dogmatic individualism for the betterment of the group as a whole. Group practice enables the establishment of an integral and compact diagnostic and treatment unit.

The age of decentralization is present in medical practice equally as much as it is in industry, and the best way to realize this is to drive through any large city, particularly in the West. There you will

notice small office buildings, scattered throughout the city, housing one or more groups of doctors and serving local communities within the larger city. The older idea of having a so-called Medical-Dental Building or Medical Arts Building is rapidly disappearing, and the prestige of occupying offices in such a building is even more rapidly going. The challenge of any form of nationalization of medical services will certainly be better met by well equipped and well functioning medical groups, rather than by many individuals engaged in duplicate, competitive practice. It would well behoove the undergraduate to consider most seriously the advantages and future of group practice.

In summary, the undergraduate must realize that he should not attempt the decision of specialization *versus* general practice, too early in his career. Should he, during his interne days, determine upon the course of a specialty, he must appreciate the fact that he must acquire first rate standing in his specialty, or the future will be bleak for him indeed. He must further realize that very real sacrifices are entailed in acquiring this standing. Finally he must be certain that he possesses the physical and temperamental apitude for the work upon which he is desirous of concentrating, in becoming an accredited specialist. These criteria are most difficult to meet and should be given profound thought.

It is not the intention of the author to attempt to dissuade any reader from engaging, ultimately, in the practice of a specialty, but rather to point out to him the very great sacrifices that must now be made in order to establish himself indisputably as an accredited specialist. Only by so doing will he weather the impending storm against whose onslaught many a poorly or insufficiently trained man will not survive.

The problems of locating oneself, while not easy, should be based on the two broad tenets of (*a*) where best would I like to live and bring up my family? and (*b*) in what manner shall I practice medicine? It is reiterated that it matters very little, whether it is a large centre or a small town, as long as the individual feels he will be happiest where he is practicing. Due regard should be taken to school facilities for his children and also the availability of recreation areas, should he enjoy outdoor life in his time off and for his vacations. A question of individual practice *versus* group practice must, likewise, be considered most seriously, and it is again emphasized that the very definite advantages of group practice in establishing a more stable future of medicine should not be overlooked. Finally, one should not be led astray by the rosy but unfortunately totally fallacious statement: "I believe I will do general practice for several years and then specialize." While actually this would be an ideal, it is one seldom capable of attainment. I do not believe that more than one person in a hundred ever is afforded the opportunity of breaking away after three to four years in general practice, and then studying for another three to five years in order to qualify as a specialist. It is simply not practical in this present day.

For you, as medical students, the door is opening toward a future whose making is in your own hands. The future of medicine offers more variety than ever before but the choice must be made with infinitely greater care than ever before. At no time in the history of medicine is the old adage, "make haste slowly," truer than it is now at the outset of your professional careers, but when your paths are set, never have there been greater opportunities to give to Canada the finest medical care it has ever known.

BURNS

A. W. FARMER, M.D.*

THE GENERAL MEDICAL PROFESSION'S intensity of interest in the subject of burns varies greatly from period to period. In time of war, it reaches its height because of the expectation of large numbers of burns among both the civilian population and the personnel of armed services. Fire has been used from time immemorial as a weapon against the enemy. The efficiency of its use has been multiplied so that now there is a greater possibility than ever of its being a major weapon in any future conflict. In peace time, burns are largely childhood accidents and hazards in certain industries. During the last war, whole populations were indoctrinated concerning the dangers of burns and the first aid methods of treatment. Within the armed services, teaching on this subject was given by means of lectures, distribution of pamphlets and educational pictures. As a result, at the present time, the general level of treatment of a burned patient is excellent. The acceptance of an invitation to write an article on this subject stems from a desire to keep the new physicians well informed on this matter. Manifestly, in a short article of this variety, it will be impossible to do justice to a subject upon which text-books have been written. Certain aspects will be emphasized which are considered important. The remarks to be made will apply to thermal burns only, rather than to chemical, radiation, or electrical burns.

A burn is a wound which partially or completely destroys the skin covering. Thus, the deeper tissues are exposed to external malignant influences. The wound may be small, in which case, the local reaction to the injury is the important factor throughout the course of the "disease". Its course will vary greatly, depending upon whether the destruction of the skin covering has been superficial or deep. Thus, it is important to obtain some idea concerning the depth of the injury when viewing a burned area for the first time. When the damage is either very superficial or very deep, no difficulty is encountered. However, it is impossible in some cases, by any methods which are known at present, to determine the depth of the injury in the dermis when it is deep in this structure, without penetrating it completely. In order to facilitate the description of a burned area in relation to its depth, a classification using three degrees is in general use. A *first degree burn* causes a superficial destruction of skin in which the damage is limited to the epidermis and the tops of the papillae. A *second degree burn* causes a deep destruction of skin in which the damage may extend to the bottom of the dermis leaving some epithelial structures undamaged. These include epithelial cells in relation to hair follicles, sebaceous and sweat glands. A *third degree burn* causes a complete destruction of skin with or without destruction of the underlying tissue. The importance of this classification is that a prognosis may be given concerning rapid healing of a burned surface. Those of first degree are usually healed within a week. Those which are in the superficial portion of the dermis are healed within ten days. Those damaged to the deeper layers of the dermis may take between three and four weeks for the recovering

*Associate in Surgery, University of Toronto.

of the surface. This is accomplished by the growth of undamaged epithelial elements in relation to hair follicles and glands of the dermis. In those cases where all epithelial elements have been killed, healing can only take place by growth of epithelium from the edges of the ulcer. With the accompanying contracture which takes place in the granulation tissue base of the ulcer, this does not take long for small areas. For large areas, months or years may not accomplish the recovering. It is in such cases that skin grafting is used.

In a small wound, the important feature is the depth of damage. Such wounds may occasionally be treated by excision with immediate skin grafting or with direct closure. This hastens healing by dispensing with the time required for the separation of the dead tissue from the living and the recovering of an ulcer. In a large burn, however, while the depth is extremely important, other factors obviate the use of immediate excision with suture or skin grafting. The reaction of the tissues to burning is of such a nature, that when the lesion is large, the patient will be in danger of death within a few hours following the injury. Because of this, general therapy to an extensively burned patient has precedence over local therapy. Immediately following the damage, there is an outpouring chiefly of the fluid portion of the blood into the tissues adjacent to the injury. This can be of such proportion, that the patient will show signs and symptoms of severe secondary shock, due to sudden severe reduction in circulating blood volume. Space does not permit a detailed description of this phase in the clinical course of a patient with a severe burn. The pulse becomes very rapid. The skin of the extremities becomes cold and clammy and slate grey in colour. The peripheral circulation is very slow as evidenced by the return flow after blanching with digital pressure. There is finally a severe drop in blood pressure, but this is a late phenomenon. Its occurrence is not awaited before energetically commencing therapy. The patient is usually drowsy, although irritable when roused. Vomiting is not uncommon and the material which is ejected may be "coffee grounds" in colour. This appearance is due to blood changed by the stomach content. At this stage, petechial hemorrhages beneath the mucosa of the lower part of the esophagus, stomach and upper portion of the small intestine are not uncommon. Occasionally there is deep ulceration. There is an oliguria with a highly concentrated urine, occasionally containing albumin and granular casts. There may be haemoglobinaemia and haemoglobinuria.

Such a picture of secondary shock does not occur if the patient is seen soon after the accident and appropriate treatment commenced immediately. This treatment should be empirical. It should be presupposed that patients with burns beyond a certain percentage of the total surface area, are in danger of loss of life unless treated immediately and adequately. Correct action at the correct time is of paramount importance with all burn therapy. The surface area affected must be accurately estimated at first glance. Infants with a burned area measuring five per cent, older children with a seven or eight per cent area and adults with anything beyond ten per cent, should have treatment designed to increase the volume of fluid circulating in the blood vessels.

Relatively large amounts are required. These are given intravenously in the form of whole blood, plasma, reconstituted serum and electrolytes. If a pa-

tient is very ill with secondary shock on admission, more than one vein is used and the fluid is pushed into the circulation under pressure until sufficient has been given. The question of "how much" is sufficient is a matter of opinion, which has not been completely amalgamated by observers treating large numbers of burns. Many formulae have been devised to help the uninitiated. As a result of the outpouring of the fluid portion of the blood into the tissues, there is an increase in the red blood cell count, the haemoglobin and the hematocrit. Other changes also take place in the chemistry and physical make-up of the blood which will not be detailed here. The concentration of the red blood cells, however, gives a fairly easy if somewhat inaccurate method of determing the amount of blood volume change which has probably taken place. A number of the formulae are based upon this thought. At the Hospital for Sick Children, the amount of fluid given immediately, measures three to four cubic centimeters per ten pounds body weight, per one per cent estimated rise in haemoglobin. Additional fluid is given if indicated by further tests. The greatest weakness with this type of formula is that the patient's haemoglobin level previous to the accident is not known. It is therefore safer to presuppose that the patient has had a level which is ninety per cent of a normal level for an individual of that age. In childhood, there is great variation in the normal haemoglobin, depending on the age. The blood of the new born child has a very high haemoglobin content. This falls rather rapidly and then rises slowly over a period of years. Haemoglobin charts should be consulted in the case of children to determine the normal range. The fluid is given rapidly at first. The injection is continued with electrolytes, particularly if the patient is vomiting.

The general therapy in the early stages has been outlined. Concerning local therapy, there is great diversity of opinion. The amount of outflow of fluid from the vessels into the tissues can be controlled to some extent, by means of treatment measures taken locally. The most important of these is the local application of pressure. Consequently, all extensive burns should be treated locally by pressure dressings. It should not be forgotten that a burn is a large open wound, subject to many outside influences. Contamination with resultant infection is one of the most important of these. All local therapy then should be devised to exclude contamination or remove it if possible, if it has already occurred. With this in mind as a first aid measure, the area may be wrapped in the cleanest cloth which is available and the patient transported to a place where definitive therapy can be initiated. There is difference of opinion concerning the cleansing of a burned surface. Some argue that the surface is probably sterile as a result of the burn and that the physical act of cleansing may do further damage. These prefer to apply a dressing immediately without cleansing. Most observers, however, believe that there is virtue in a primary cleansing. At the Hospital for Sick Children, this is performed under adequate sedation with morphine and with antiseptic precautions, in an operating room. General anaesthesia is not employed. One per cent aqueous cetyl-trimethyl-ammonium-bromide (cetavlon) is used to cleanse the area. This is a detergent and a powerful bactericide. This is then sluiced off with saline and the area blotted dry with a sterile towel. Following this, the primary dressing is ap-

plied. The important fact to remember about any substance which is placed on an open area, such as results from a burn, is that the soluble constituents of it immediately appear in the blood stream in large quantities. Therefore, such constituents must beinnocuous. Many materials are relatively safe in small quantities, but in large quantities are harmful. Therefore, even such materials as boracic acid should not be applied. Ointments have been the popular choice. Here, however, the factor of maceration becomes important. Maceration may result in the death of cells which might otherwise remain as islands of regenerating epithelium. Sterile vaseline on a gauze covering is the most commonly employed surface application. However, for over a year at the Hospital for Sick Children this has been supplanted with a thin metal foil of aluminum. This is innocuous to the surface. It acts as a barrier between the tissues and the remainder of the dressing and does not adhere firmly when the dressing is removed. Healing has been favourably influenced under such a cover. Other metals have been used, but aluminum is in plentiful supply and cheap. Its use has been standardized for some time. Over whatever is applied to the burn locally, is placed an occlusive pressure dressing. By this is meant, that the dressing should extend well beyond the edges of the burned area. Considerable volume of dressing material should be used, so that it may be compressed against the burned surface with elastic bandages. This helps to control the outpouring of fluid locally and reduce the hazard of contamination from without. If such a dressing becomes moist, it should be changed. Contamination from without is rapid when the fabric becomes wet. Otherwise, such a dressing is not changed for ten days. At this time, all superficial burns will be healed. The deeper burns will require further treatment. This original type of dressing may be repeated, or if the damage has been deep and the process of slough separation is underway, the surface application may be changed to moist sodium hypochlorite (hygeol) of appropriate strength. Some acids hasten slough separation and are occasionally used. Pyruvic acid is one such substance.

The immediate local and general therapy has been sketchily outlined. If a large deep burn has been sustained, extensive areas of ulceration will result, requiring skin grafting. Extensive denuded areas allow the passage of large quantities of serum and in some cases also red blood cells into the dressings daily. In addition to this, in any extensive injury, there is initiated a catabolism of protein which is little understood. The patient loses much weight. Unless the intake of total calories and of protein is maintained at a very high level, the patient may die with this nutritional disturbance. Therefore with all extensive burning, the patient should be placed immediately on a high caloric, high protein diet. A secondary anaemia of considerable extent is present at the end of one week to ten days, following severe extensive burns. This is the result of many factors, some of which are not clearly understood. However, on this account, reduced iron is added to the diet. Following the injury, blood ascorbic acid levels fall. The diet is kept high in vitamins. There is much that is empirical in this form of therapy. Many avenues for investigative work are open. Undoubtedly, much will be clarified within the next few decades.

All extensive deep burns require much skin grafting. This must be performed

with the patient's own skin. The skin of others may be used as a temporary procedure. Large open areas may be closed for approximately six to eight weeks in such a fashion. Homogenous grafts, however, distintegrate eventually and must be replaced by autogenous grafting. The answer to this problem is not likely to be found soon and provides a field for much interesting research work. The time has now arrived when severely burned patients are made to survive the initial course of their disease, only to die because they have not enough skin remaining to recover themselves.

In conclusion, remarks have been made concerning some aspects of burns which are considered important. The subject has by no means been covered. A most important aspect of treatment is prevention. In children, burns are second on the list of causes of accidental death, being only superceded in the last decade, by that dangerous weapon, the automobile.

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PREMEDICAL STUDIES

IV. THE PREMEDICAL COURSE AT THE UNIVERSITY OF TORONTO

H. WASTENEYS, PH.D., F.R.S.C.*

It seems proper to commence a discussion of the two premedical years at the University of Toronto by reviewing briefly the content of the two year curriculum and to follow with an explanation of the purpose for which this curriculum was devised and some discussion of the desirability of attempting to achieve this purpose.

The two year curriculum consists, briefly, of the chemistry, physics, biology and psychology which are fundamental to medical science, together with English, one or both of history and philosophy or, if both history and philosophy are not chosen, then a selection of one of anthropology, botany, a foreign language or mathematics, with the proviso that all subjects in the curriculum except biology, physics and psychology are taken in both years.

This curriculum was designed to ensure, so far as it is possible to do so in a two-year course, that students entering medicine at this University shall have acquired not only a knowledge of prerequisite science but also as much as possible of a broad cultural education. Accordingly they study, at what is often called, rather objectionably, "the university level" and at what is described, equally objectionably, as "honour standard," English and history or philosophy for two years, with a selection from other subjects. The English course gives a training in composition, through the writing of essays, and a comprehensive survey of English literature. The history course follows the evolution of modern European civilization and the social and political evolution of Great Britain, the United States of America and Canada, while the course in philosophy has been especially planned to give a philosophical background for scientific and medical thinking. The other options have been designed to give a similarly broad survey of the several fields of study, adapted, where desirable, to the cultural needs of students of medicine.

How far these two years succeed in achieving their purpose is difficult to decide. Certainly some students get far more value from such courses than others do. It has always been possible to take a horse to the water-trough but no one has discovered how to make the horse drink if he does not want to do so. Moreover, the willingness of students to assimilate humanistic culture will depend to a considerable extent upon the quality of their previous education and upon their home environment.

There is, of course, nothing novel in the idea that students of medicine should be broadly educated persons; indeed, it is only in the position of the subjects and to some extent the subjects presented for study, that the present curriculum in our university differs from that of former years. During the previous twenty-eight years, there was a rather wider selection offered of what used to be called "compulsory cultural options." They were not restricted to

*Professor of Biochemistry and Head of the Department, University of Toronto.

the first two years nor were they required to be taken so intensively or, at least in the opinion of the students, so seriously as is thought desirable today. They were, indeed, treated as "pass subjects" and they were intercalated throughout the first four years of the six-year medical courses. The Faculty, as the years passed, became more and more convinced that this procedure failed to accomplish the end desired and the present two-year premedical course was substituted in 1946.

The calendar for 1920 and the intervening years, described this part of the curriculum as providing "for the student filling in and amplifying his regular work with special studies that are designed to broaden his general education and therefore make him better fitted for the practice of medicine. . . . The student who has some previous acquaintance with science and feels confident that he will not experience any exceptional difficulty in familiarizing himself with the prescribed subjects, is advised to devote a certain proportion of his optional hours to the study of such subjects of general knowledge as will assist in providing him with that breadth of outlook and catholicity of interests which will enable him to enter with intelligence into the life and interests of the communities with which he may find himself associated and to speak and write in a clear, simple and convincing manner." The latter part of this statement describes, excellently, the purpose of the present pre-medical course.

This insistence on the necessity for a humanistic approach to the study and practice of medicine is, of course, not peculiar to Toronto—the necessity is recognized by all medical schools although the method varies—nor is it modern — Hippocrates, the father of medicine, nearly 2400 years ago described medicine as "a profession of a cultured gentleman"—nor is it peculiar to medical schools. It is, indeed, generally agreed that education for any profession should ensure that its members shall "constitute a responsible and discriminating group in the community, capable of discriminating between fact and fancy, duty and inclination, culture and amusement."[1] If this be true for professions in general, it is particularly true for the medical profession, which must not only cure illness and preserve health but must be concerned with every phase of human interrelations in order to care properly for its patients. Only a liberally educated, humane individual is competent to fulfill these responsibilities and this presupposes a background of humanistic study in addition to the most complete training in the science and art of medicine.

The necessity for a humanistic background has been especially emphasized by those responsible for medical education during the past century. The College of Physicians in Great Britain is an example. To quote Dr. A. R. Cawadias: "In all its activities the College (The Royal College of Physicians) maintained particularly the cultural humanistic background for physicians which was endangered during the ultra-positivistic and mechanistic XIX century. The development of this humanistic background since 1825 took the form of an intensified cultivation of the history of medicine . . . not the collection of facts . . . but the approach to human and medical problems by means of historical philosophical thinking."[2]

[1]Michael Roberts: "The Recovery of the West," London, Faber and Faber, 1941, p. 303.
[2]Proc. Roy. Soc. Med. **34**, 821 (1940-41).

In 1850, the court of examiners of the Society of Apothecaries, which is one of the twenty-one licensing bodies in Great Britain, conscious of this need, instituted a preliminary examination in Arts as a necessary prerequisite to the medical curriculum. The report of the Medical Curriculum Committee of the British Medical Association, published last year, expresses the same view. It expressed "strong disapproval of specific vocational trends in premedical school curricula. In the medical curriculum proper cognizance must be taken of the human relationships and social responsibilities of the doctor." "The prospective doctor should receive a liberal and general education before embarking upon his special medical studies."[3] Dr. Abraham Flexner, the greatest living authority on Medical education, is also quoted. "The Physician should first of all be an educated man; that is required by his position in the community and his relations to the patient and the patient's family."[3]

In Great Britain the system of medical education differs somewhat from that on this continent. There, premedical education is obtained in secondary schools between the ages of 16 and 18 years. On this continent, the most usual prerequisite for entrance to the medical course is a degree in Arts; this has the advantage that students are selected for admission to the medical course after three years of Arts and the selection is therefore made from a more mature group than is the case in Toronto where it is made from a group which has just left the High Schools. It would necessitate, in Toronto, seven years in the University followed by an interne year. The existing alternative is less severe in its requirement of time and money.

It is, of course, true that our schools, primary and secondary, together could, and indeed should, provide the liberal humanistic education which is not only desirable as preparation for the professions but is also essential for the majority of citizens if democracy is to continue as the form of our government in the mechanized scientific age on which we are entered. Principal Wallace, the former Principal of University College, once wrote "The High School holds the key to the problem of how we are to have lawyers, doctors and engineers who are broadly educated cultivated gentlemen as well as highly trained specialists."[4] That our schools do not use this key very successfully seems evident from the considerable proportion of students who come to the University, as the writer has said elsewhere, schooled it is true, sufficiently educated perhaps for mere material success in a competitive world, avid for further facts with which to complete their preparation for a successful professional career (and to pass the necessary examinations) but with little capacity to handle ideas, little or no sense of values and little or no desire to further their own intellectual or cultural development.

The professional faculties, with the co-operation of the faculty of Arts, endeavour to afford as much opportunity as is possible within their curricula for their students to acquire at least the elements of a liberal education. Our Medical faculty does this in its premedical course the effectiveness of which is supplemented or rather, enhanced, by the inspiring lectures of Professor Van Wyck in the second medical year on "Humanism and Medicine."

[3]"*The Training of a Doctor*," London, Butterworth's Medical Publications, 1948.

[4]Dr. Malcolm W. Wallace: "Education for the Professions," School and Society, **34**, 245 (1931).

SOME APPLICATIONS OF RADIOACTIVE ISOTOPES TO MEDICINE

MISS SYLVIA RAMCHARAN, 5T1

AND

W. BERNARD HICK, B.A., 5T1

The use of isotopes in medicine, both in therapy and in metabolic studies basic to advances in medical science, received tremendous impetus from the wartime development of the chain-reacting pile with the consequent increased availability of many kinds of isotopes. Essentially an isotope of an element is one which behaves chemically and metabolically in exactly the same way as does the naturally occurring form but which is distinguished from it either by greater mass (stable isotope) or by radioactivity (radioactive isotope).

A radioactive isotope may emit one or more types of radiation: (*a*) alpha rays, which produce great tissue destruction over a very limited zone are given off by only one percent of the radioactive isotopes and are of little interest here; (*b*) beta radiations which are of two types—beta-negative and beta-positive—with identical biological effects and which cause less tissue destruction than alpha radiations but are slightly more penetrating; and (*c*) gamma radiations which possess the greatest penetrating power of the three types. Today it is possible artifically to produce radioactive isotopes of nearly all the elements by bombarding their natural forms in the cyclotron or in the uranium chain-reacting pile; however, those of phosphorus, iodine, iron, calcium, strontium, chlorine, sodium, potassium, carbon, hydrogen and sulphur are the ones widely used in medical research.

APPLICATIONS TO MEDICAL RESEARCH

The most important application of radioactive isotopes in medical research is their use as "tracers" in the study of the metabolism of various substances rendered radioactive by having one or more atoms of a radioactive isotope synthesized into their molecules. An isotopically "labelled" substance will undergo the same metabolic reactions as the normal substance but will always be distinguished from it by its radioactivity.

The physical methods used in these isotopic studies are so extremely sensitive that it is possible to detect and to determine accurately very small amounts of materials so labelled. In the use of radioactive tracers, three general techniques of visualization have been developed:

(*a*) The radioautograph. Here the animal is given a single dose of the tracer material, and then, at intervals thereafter, sections of various tissues are prepared and these are placed in contact with a photographic emulsion so that any radioactivity present in any area of the section causes an "exposure" of the film in contact with this area. The tissue may then be stained and compared with the developed film to determine the regions in the tissue storing the tracer substance. It is of historical interest to note in connection with this method that radioactivity was discovered by

Becquerel as a consequence of the actions of radiations on a photographic emulsion.

(*b*) The *in vitro* method. In this procedure, samples of tissues, blood, cerebrospinal fluid, urine or feces are taken at intervals following the administration of the tracer and weighed, processed chemically and measured for activity. This method is used especially to trace the distribution of the beta-negative-emitting isotopes.

(*c*) The *in vivo* method. This involves the application of a Geiger counter to various portions of the body to detect tracers emitting gamma radiations. The method is of only limited value for locating beta-negative-emitting tracers because of the very slight penetrating power of these radiations. This method is most useful in cases where the tracer is selectively deposited in a localized area, such as radioactive iodine in the thyroid gland, or where the object of the experiment is to determine the time of arrival of the tracer in a given area, as in the determination of the circulation time.

Interesting examples of investigations employing radioisotopes are now legion. Only a few will be considered briefly here. Radioactive iron has been used in studies of iron metabolism especially as related to hemoglobin synthesis. Whipple and others have shown that the amount of iron absorbed is determined by the need of the body at the time; that is, the amount of iron in the body is controlled by absorption and not by excretion. They showed, further, that a low blood hemoglobin level is not sufficient to increase absorption but that the tissue reserves of iron, which have been shown to lie chiefly in muscles, must be depleted first. Recently, radioactive iron has been used to determine the life of the red blood cell in the body and its survival time in stored or transfused blood.

Radioactive calcium and strontium are selectively deposited almost exclusively in bone and thus, they are mainly used to study mineral metabolism in bone during normal ossification, healing of fractures and in nutritional diseases such as rickets. Other problems in which calcium has been used relate to the mechanisms of action of the parathyroid glands and the D-vitamins and the nature of the unionized calcium of blood serum.

Radioactive iodine has, of course, been used extensively in the study of thyroid function, because it is easily detected by an externally placed Geiger counter. The remarkable power of thyroid tissue to concentrate iodine approximately five thousand times more than other tissues has been demonstrated with this isotope, and it has been shown that radioactive iodine is detectable in the gland within a few minutes after its ingestion as sodium iodide.

Radiophosphorus is, at present, the most extensively used of all the radioactive isotopes, chiefly because it is the most readily available. In addition to the usual studies on absorption, excretion, distribution and metabolism of phosphorus, other vital phenomena have been investigated by means of P^{32}, such as protein and phospholipid metabolism, intermediary muscle metabolism and exchange reactions of phosphorus and phosphate. Studies on phospholipid synthesis and metabolism and lipotropic action have been particularly intensive and fruitful. The tendency of radiophosphorus to be selectively localized in rapidly growing cells has provoked considerable interest in the possibility of its use in differentiating malignant and

benign neoplasms, and has led to its use in the therapy of polycythemia and leukemia.

Thus, radioactive isotopes are providing a new and useful tool for medical research. New fields await discovery and cultivation, old ideas may be modified or substantiated, and present investigations may be usefully expanded by the skilled and careful use of this comparatively recent technique.

THERAPEUTIC POSSIBILITIES OF ARTIFICIAL RADIOACTIVE ISOTOPES

The therapeutic uses of radioactive isotopes are very few, contrary to what one is led to think by reports in the popular press. As yet, there is a great need for extensive experimental and clinical investigations to assess the contributions of radioisotopes to therapeutics. Moreover, the injurious effects that both physician and patient may suffer make the use of radioactive substances extremely hazardous. Once a radioisotope has been introduced into the body, it may remain fixed there for a long time and if it has a long half-life, the body tissues will be subjected to prolonged exposure to its radiations with serious consequences. The various radiations produce their effects on tissues by causing ionization and chemical alterations in the molecules. If these changes take place in a vital part of the cell, such as a chromosome, death of the cell may result. The therapeutic value of any form of radiation, whether beta particles, X- or gamma-rays, depends on this property of causing chemical change.

There are two general uses for radioactive isotopes: (*a*) external radiation therapy, as a substitute for radium, and (*b*) internal radiation therapy by intravenous or oral administration of radiosalts.

EXTERNAL RADIATION

Radium substitutes have two uses:

(*a*) Superficial beta-ray therapy. The main requirement for a radio-element is that it should emit beta-rays with energy comparable to that of radium. The most promising substitute is radioactive phosphorus, P^{32}.

(*b*) Deep gamma ray therapy. Radiocobalt, Co^{60}, appears to hold out some promise as a gamma ray source. Two of its advantages are the ease of fabrication of special applicators from inactive cobalt which can be activated to any desired extent by neutron bombardment, and the ease with which this activation can be accomplished.

INTERNAL RADIATION

From the time of the discovery of radium, the idea of internal administration of radioactive substances has been entertained. However, the high toxicity of the radio-elements then known prevented the application of internal radiation. With the recent advances in synthetic production of less toxic radioactive substances, this method of therapy is receiving greater consideration, and it should be possible to bring radiation to deep-seated organs without incurring the risk of radiation sickness and skin damage resulting from the use of X-rays and radium. In practice, this method has met with some success but the results obtained so far have not been outstanding.

The value of a radioelement as a means of internal radiation depends upon the relative affinity for it of the tissue to be irradiated. A radioelement would be therapeutically valueless if it were distributed uniformly throughout the entire body because the normal body tissues would be exposed to its deleterious effects even before an adequate concen-

tration of the element could attain in the tissue to be irradiated. Only a few radioactive elements are thus selectively absorbed, therefore this type of treatment is limited in scope.

It is known that cells are more or less sensitive to radiation depending on their stage in the mitotic cycle, those in the prophase and metaphase having been found to be most sensitive. Therefore, it should be possible to destroy neoplastic tissue by radiating it continuously long enough for all the cells to be irradiated during the most sensitive parts of their mitotic cycles. This can be done more easily by the internal use of radioactive isotopes than by the conventional external irradiation with X- and gamma-rays.

The enhanced metabolic activity of neoplastic tissues also increases the tendency of these tissues to take up greater concentrations of radioactive isotopes than would normal tissues. However, the degree of the effect of radiation on the abnormal tissue as compared with that on the surrounding normal tissue will determine to a very large extent the therapeutic value of a radioactive substance.

At present, the only radioactive elements known to produce significant results are: radiophosphorus, in the treatment of leukemia and polycythemia, and radioiodine, in the treatment of hyperthyroidism.

Radioactive Phosphorus

The effectiveness of this element lies in its selective absorption by neoplastic tissues and rapidly growing cells such as those of leukemia and polycythemia vera. The sites of greatest concentration of P^{32} after administration are in the bone marrow, lymph nodes, liver and spleen. The advantage of a radioisotope used internally over X-rays applied externally in such conditions is obvious. The sites to be irradiated are so widely scattered that it is difficult to administer X-rays without giving a harmful dose of total body irradiation. However, the beta rays of P^{32} can penetrate several millimeters of tissue, and therefore, normal cells in the neighbourhood are liable to injurious effects and care must be taken to reduce the possibility of overdosage.

In the treatment of chronic myeloid leukemia, the results are no different from those obtained with X-radiation and there is no remarkable lengthening of life after irradiation therapy with P^{32}. The advantages over X-rays are the ease with which P^{32} provides generalized irradiation and the lack of radiation sickness.

In the treatment of polycythemia vera, the results are more promising. P^{32} is the treatment of choice if it is available. However, the effects are temporary and relapses are common. There is evidence that a patient lives slightly longer with such treatment than with venesection.

P^{32} has no advantage over X-rays for treating chronic lymphoid leukemia. Results are not satisfactory in the treatment of the acute leukemias, Hodgkin's disease, lymphosarcoma, multiple myeloma, malignant melanomas or cancer of the breast.

Radioactive Iodine

The therapeutic use of I^{130} and I^{131} was suggested by the marked tendency of this isotope to be selectively absorbed by the thyroid gland. Radioactive iodine has been found to produce beneficial results in hyperthyroidism but it has not been generally effective for cancer of the thyroid.

A consideration of the work that has been done in this field shows that of 51 patients treated for hyperthyroidism, 36 gave a satisfactory response judged by a fall in metabolic rate, 11 cases had an inadequate response because of insufficient dosage, and 4 showed an excessive response which resulted in a state of hypothyroidism. Treatment of cancer of the thyroid by this method has not met with much success because of the failure of the radioactive substance to be localized in the cancerous tissue.

Radioisotopic Therapy

In general, radioisotopic therapy shows no significant advantages over X-ray therapy. Indeed, in a few instances, therapeutic attempts with such substances have resulted in harmful effects. Radiostrontium, which was suggested as an effective agent for the irradiation of bone, has been shown to be capable of producing osteogenic sarcomas in animals. This emphasizes the necessity for thorough and extensive investigation of all the possible effects of a radioactive substance before it is employed therapeutically. The increase in the use of radioactive substances within the past few years has created a problem. More and more people are liable to be exposed to the harmful effects of radiation if care and restraint are not exercised in the employment of radiosubstances. So far, investigations have demonstrated that the greatest benefit to medicine from radioisotopes would be in the increased knowledge of fundamental physiological processes in the body. This may lead to ideas of new methods of therapy other than radiation.

ACKNOWLEDGEMENT

The assistance of Dr. G. C. Butler and Dr. B. Crocker in the preparation of this article is gratefully acknowledged.

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THE PRACTICE OF MEDICINE IN FOURTEENTH CENTURY ENGLAND

D. A. BARR, 5T3

A FAIRLY comprehensive and critical survey of Fourteenth Century English medical practice may be found in the literature of that day, especially in *Canterbury Tales*. Throughout this work, Chaucer makes liberal use of medically significant details to characterize and make real the pilgrims of the story. Underlying the use of these details, and essential to a full understanding of the characters, is a knowledge of the bases of medieval medicine.

One basis was the "science of astronomye", today's astrology, which was an integral part of medical reasoning. The relations of the planets to each other and to the parts of the body which they controlled were believed to be the prime cause of disease. No physician worthy of the name would make a diagnosis without a complete knowledge of the patient's astrological history from conception on. A medicine would not be effective, if given during the wrong astrological conditions. Because the planetary relations were continually changing, it behooved the doctor to keep "his pacient a ful greet deel in houres, by his magyk natureel." In time of crisis this "magyk natureel" was employed in the making of an astrological "image" designed to promote the ascendancy of favourable planets, thus overcoming the evil-producing combinations. However these "images" do not seem to have been strong enough to halt the march of the bubonic plague of 1348. This outburst was blamed on a very rare conjunction of Saturn and Mars (or Jupiter) in Sagittarius.

The other basis of medical reasoning was the Doctrine of the Four Humours. This doctrine was first concretely stated by Galen. It postulated that the body consisted of the four primary elements which had been discovered by the Greek philosophers: earth, air, fire and water. Each element possessed specific qualities: earth was cold and dry, fire was hot and dry, air was hot and moist and water was cold and moist. Each was related to a corresponding bodily humour: earth to the humour, melancholia; fire to cholera; air to phlegm and water to blood. These humours were generated in the brain, heart, liver and stomach respectively, usually in fairly well balanced proportions. When one humour became dominant the patient became ill and took on the symptoms attributed to whichever humour was paramount. These were the temperaments of man and supposedly represented an unhealthy state. Thus, when we read of the Miller,

> "His berd as any sowe or fox was reed,
> And thereto brood, as though it were a spade.
> Upon the cop right of his nose he hade
> A werte, and thereon stood a tuft of heres,
> Reed as the bristles of a sowes eres."

we get the impression of feverishness and stiffness of hair, two choleric symptoms. When we find out that he is also drunk we are well prepared for the low tale which he tells. The Reeve, who takes offence at the tale, and who is also choleric, promptly replies in the same vein. The Franklyn, on the other hand, being of sanguine temperament, tells a noble tale of Dorigen and Arviragus.

The four humours were not the sole determiners of disease, as we have seen. In actual fact they were held to be less

strong than the "astronomye" factors, and were called secondary causes of disease.

Besides these two major theories of causation, Chaucer also mentions two minor ones. The first, the Vermiform theory, is suggested in the lines:

> "If cow or calf, or sheepe, or oxe swelle
> That any worm hath ete, or worm y-stonge."

The second, the Sanitation theory, is vividly portrayed in both the Prologue and in the Host's remarks which preface the Cook's Tale.

> "But greet harm was it, as it thoughte me,
> That on his shyne a mormal hadde he;
> For blankmanger, that made he withe the beste."
> "Of many a pilgrim hastow Cristes curse,
> For of thy persely yet they fare the worse,
> That they han eten with thy stubbel-goos;
> For in thy shoppe is many a AA loose."

This latter theory was exceptionally advanced for the times, so Chaucer did not incorporate it into his Docteur of Phisik's store of knowledge.

In this store of knowledge, however, is included, besides astrology and the doctrine of the four humours, a comprehensive acquaintance with the works of seven Arabian, five Greek (including mythical works of Aesculapius) and three English writers of authoritative medical treatises:

> "Wel knew he the olde Esculapius,
> And Deiscorides, and eek Rufus;
> Old Ypocras, Haly and Galien;
> Serapion, Razis, and Avicien;
> Averrois, Damascien, and Constantyn;
> Bernard, and Gatesden, and Gilbertyn."

In addition, he was "grounded in astronomye", and he "knew the cause of everich malady, were it of hoot, cold, moiste, or drye, and where engendered and of what humour." This combination enabled him to diagnose and prescribe faultlessly. In Chaucer's words "he was a verray parfit practisour." The fact that "his studie was but litel on the Bible" would seem to indicate that he had not taken Holy Orders and hence was representative of the physicians who were breaking away from monastic control. At this time, nonetheless, the monastery supplied the doctor's education in the abstract sciences, the trivium and quadrivium, and the university supplied only training in scientific medicine. Possibly Chaucer was in favour of divorcing religion from medicine. To enhance this impression, he dresses the physician well.

> "In sangwyn and in pers he clad was al,
> Lyned with taffata and with sendal;"

and gives the impression of a well-to-do man, while he depicts the friar, the former doctor, as a man low in the social scale:

> "He knew the tavernes wel in every toun,
> And everich hostiler and tappesterre
> Bet than a lazar or a beggestere."

This poor state of the friar is representative of the state of all the quacks—the barber-surgeon, the dentist, the cupper, the curer of ruptures, and the other amateur surgeons. Since the respectable physicians, like our Doctour of Phisik, preferred town or court practice, these mountebanks were allowed to roam the countryside preying on the poor peasants, who would have been much farther ahead left to their own home-grown herbal remedies, which would have been sufficient to cure most of the "overeating" ills common to the day. That was another point in favour of the doctour:

> "Of his diete mesurable was he
> For it was of no superfluitee."

To be representative of his class, however, the Doctour must have his faults. These Chaucer finds to be two in number: his love of gold and his alliance with the pharmacist.

As Chaucer says:

"Gold in phisik is a cordial,
Therfore he lovede gold in special."

and

"He was but esy of dispence;
He kepte that he wan in pestilence."

This greed probably stemmed from the fact that fees were very hard to collect in the Fourteenth Century, and the doctors, therefore, made the most of their opportunities. Of the doctor-pharmacist relationship, says Chaucer:

"Ful redy hadde he his apothecaries
To send him drogges and his letuaries,
For ech of hem made other for to wynne;
His frendshipe was not newe to bigynne."

Was this the ancestor of the modern split-fee system sometimes practised? We see then that Chaucer was well able to describe a contemporary physician. In fact, some authorities have identified his Doctour of Phisik with a concrete practitioner of the day, John of Gaddesden. If such were the case, and Chaucer actually knew him well, then that might explain the wide knowledge of medical tradition which is manifested in the *Canterbury Tales.*

Thus it may be seen that a fairly complete picture of Fourteenth Century English medicine can be found in the contemporary literature, notably the *Canterbury Tales.*

THE UNIVERSITY OF TORONTO
MEDICAL JOURNAL
(An Undergraduate Publication)

This journal is published six times during each session, between October and April, by the Medical Society of the University of Toronto, to serve as a medium for student expression and to bring to each student recent articles of scientific interest.

$2.50 per volume. **50c per copy.**

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EDITORIALS

OF SERENDIPITY AND HUMILITY

"Dans les champs de l'observation, le hazard ne favorise que les esprits préparés."—*Pasteur.*

Horace Walpole, the English statesman, introduced into our vocabulary "serendipity" to designate "making discoveries, by accident or sagacity, of things" unsought. Despite infrequent usage, it has come to refer to the happy faculty of finding unforseen evidence of one's ideas or unexpectedly discovering new objects or relations which, actually, are not the subject of one's quest. Outstanding contemporary examples in medicine include Cannon's discovery of the influence of emotions on gastrointestinal motility and Fleming's discovery of penicillin.

Such "chance" discoveries not only involve the phenomenon to be observed but also the appreciative and intelligent observer. Pasteur recognized this fact in his wise and discerning dictum that, in the fields of observation, "chance" favors only the minds which are prepared. The late W. B. Cannon understood it well.

In the course of our human experiences, one can neither tell what new circumstances may arise, nor predict the moment of their arrival. Opportunities with long-lasting and fateful consequences may appear tomorrow. The unexpected is continually happening in our lives much as it happens in the realm of scientific research. "Chance" throws peculiar conditions in our way and, if we are alert, we see their importance and make use of the opportunities. If we are to benefit by such occasions for securing fresh insight and enlarging our experiences in untried directions, we must be well equipped with knowledge of the past. Only when we know what has

already gone before us can we judge the present scene—only when our minds are well prepared.

Another implication in Pasteur's dictum is the importance of avoiding rigid adherence to fixed ideas. It is quite natural for the uninstructed intelligence to find a comfortable security and serenity in a set of conventional opinions which have been satisfactorily prearranged but the possibility of adventures in ideas is unknown to such benighted persons.

Regard for the learning of the past, tolerance and free discussion of novel suggestions of the present, and readiness for cautious experimentation and observation when the opportunity offers—these are the features typical of the prepared mind. They are typical, also, of the finest educational spirit. "Alert and thoughtful graduates will go forth from a school or college when alert and thoughtful teachers, encouraged and fostered in their labors, exert their influence within its portals." Such can be the graduates of our Faculty of Medicine.

When confronted by the complexities of life and health, of death and disease, alert and thoughtful physicians can be certain that quite unforeseen possibilities of securing the answers will spring forth—opportunities of serendipity, for which they will be sagacious. With their wisdom must go humility, "the honest humility of true magnanimity, fearless because it makes no pretence, recognizing superior assets and capacities in others, acknowledging powers higher than those that humankind possesses, and admitting the likelihood that even the most capable person may sometimes be in error. It is a humility of the intellect, free from pride and arrogance." Physicians should strive to bear in mind that they may be mistaken, that true humility is a virtue that can be cultivated, and that conscious and outspoken humility is its own contradiction. In the words of Sir William Osler: "Not by the lips, but by the life, are men influenced in their beliefs, and when reason calls in vain and arguements fall on deaf ears, the still small voice of life lived in the full faith of another may charm like the lute of Orpheus, and compel an unwilling assent by a strong, indefinable attraction, not to be explained in words, outside the laws of philosophy, a something which is not apparent to the senses, and which is manifest only in its effects."

IN APPRECIATION

In the first number of this volume of the JOURNAL, we mentioned that the future of the UNIVERSITY OF TORONTO MEDICAL JOURNAL and its advancement toward a position which is in keeping with that of our Faculty of Medicine depended upon the wholehearted support of everyone: students, alumni, and professors alike. "It is up to you," we said.

Now, the time has come to close the covers of this volume and to let it take its place beside its predecessors and make way for Volume XXVII. That the JOURNAL has progressed during this session toward the goal envisaged by the original Editorial Staff and toward the attainment of a status amongst its contemporaries which is in keeping with the high position attained by the Faculty of Medicine of our University amongst the medical schools of the world, is a reasonable conclusion. The credit for

(*Continued on page 267*)

FEATURE

THE CLASS OF 4T9

THE COMPOSITION of this year's graduating class, 4T9, is shown in Table I where it is compared with that of previous years. These data show a significant increase in the size of the class and in the proportions of married students and of women in the class.

A questionnaire was distributed to the class. One hundred replies were received and an analysis of them suggests that the results obtained should be fairly representative of the class as a whole.

TABLE I

	4T9	4T8	4T7
Total.....	156	130	130
Men.....	80%	84%	88%
Women....	20%	16%	12%
Married ...	18%	..	9%

The distribution of the ages of the students replying differed from that found in previous years as is shown in Table II.

TABLE II

AGE IN YEARS	4T9		4T8	4T7
30 and over	7%	16%	2%	4%
27-29 incl.	9%			
26	2%		2%	5%
25	8%		4%	7%
24	11%		10%	24%
23	24%		32%	26%
22	35%		44%	29%
21	4%		1%	5%

During World War II, 15% of the class served with the armed forces for as long as 6 years and of them, 50% were in the Air Force, 40% in the Navy, and 10% in the Army.

Eighty-two percent of the class come from homes in Ontario, and, of these, the great majority are from Toronto. The next largest group come from Saskatchewan (9%), while a few hail from British Columbia (4%), the United Kingdom (2%), Alberta (1%), New Brunswick (1%) and the British West Indies (1%).

While attending medical school, almost half (48%) have lived with their parents. The others have lived in boarding or rooming houses (18%), their own homes (16%), fraternity houses (10%) or hospitals (8%).

A wide range of estimates, of varying degrees of accuracy, of annual expenses was reported by those answering the questionnaire, being from under $2,500 to over $10,000, but the majority of single students living with their parents thought it cost them between $4,000 and $5,000 for the time they have been attending medical school. Most single students who are not living with their parents estimated their expenses to be in the range of $5,500 - $6,500 while most of the estimates of the married students were around $8,000 or $9,000 but the amount was greater the longer they had been married.

More than one-half of the class have been unable to earn more than one-third of their expenses although one student was able completely to finance himself. Parents were hardest hit for financial assistance and 70% of them have provided for one-half or more of their son's or daughter's expenses while 15% of them have paid for all expenses but, on

TABLE III

	4T9		4T8	4T7
Undecided	4%		17%	14.4%
General Practice	57%		27%	28%
Certain		50%		
Probable		3%		
Specialize Later		4%		
Specialties[1]	40%			
Undecided		11%		
Surgery		8%	20%	10%
Psychiatry		6%	10%	5%
Internal Medicine		5%	12%	10%
Ophthalmology		3%	0.8%	1.6%
Pediatrics		3%	8%	10%
Obstetrics and Gynecology		2%	20%	13%
Aviation Medicine		1%	0%	0%
Forensic Medicine		1%	0%	0%
Public Health	1%		0%	1.6%
Medical Research	2%		0%	0%

[1]Includes the future plans of the 4% of 4T9 who intend to begin in general practice.

the other hand, 10% of them have had to provide no money. The D.V.A. and various scholarships, bursaries and loans have provided most of the remainder of the financial support of the students but in at least 80% of cases, they met less than one-half of the financial needs of the students.

With respect to other interests and hobbies, athletics and outdoor activities are the most popular amongst the members of 4T9, followed closely by music and literature. The long list of less popular ones covers a wide variety including dramatics, bridge, art, nature study, handicrafts, photography, farming, collecting stamps or books, astronomy and electronics, to mention by a few.

As far as academic background is concerned, 8% of the class have had some other undergraduate university education, 18% hold Bachelor degrees; 3%, Master; and one has a Ph.D. The remaining 70%, presumably, started their medical course immediately upon completing high school.

The most popular subjects during the four Medical Years have been medicine, surgery, obstetrics and gynecology, and pediatrics which have also been the most popular ones with previous graduating classes. The four subjects which were considered to have been the best taught were pathology, anatomy, pediatrics, and obstetrics and gynecology. The subjects which have been both the least popular and considered to be the least well taught are biochemistry, hygiene and preventive medicine, pathological chemistry and physiology (in alphabetical order).

If they could have the opportunity to relive the past 5 years, 7% of the class would not study medicine and 6% doubt

if they would. Another 3% would not want to undertake the course without either greater financial resources (2%) or a greater academic background (B.A.).

After graduation, 42% plan to intern for 1 year and 38% for 2 years while the remainder intend to intern longer. However, only 19% feel they would be satisfied with 1 year of internship and 37% with 2 years. The desires of the other 46% are almost equally divided over 3, 4 and 5 years of interning. Thirty-two percent of the class do not plan to take any postgraduate studies. On the average, the remainder plan to take 3 years but would like to take at least 4 years of postgraduate work before practising medicine.

The number of potential general practitioners in the Class of 4T9 is more than twice that of either of the preceding two years. The future plans of all three classes are compared in Table III.

At present, 60% plan to practice in urban centres, 12% in rural communities, while 28% are undecided. Sixty-eight percent intend to practice in Ontario, 22% have chosen the western provinces but none the eastern ones while a few plan to go to the United States or abroad to Asia or Africa.

While 18% already have been married for anywhere from 3 months to 8 years, another 12% of the class plan to be married after graduation and an additional 17% after they have completed their internship.

In summary, it would appear that the average member of the Class of 4T9 is about 22 years old, comes from a home in Toronto and enjoys sports and outdoor activities, music, and literature in his leisure moments. His expenses during his medical course have totalled around $5,500 of which he has earned not more than a third and most of the balance has been provided by his parents. During his medical studies he has enjoyed medicine, surgery, obstetrics and gynecology, and pediatrics in particular. In the light of his present plans, he will spend five years on his internship and postgraduate studies before beginning in general practice in an Ontario town or city and getting married.

EDITORIAL

(*Continued from page 264*)

this progress belongs equally to all of those students, alumni, and members of the Faculty who have cooperated in the production of the JOURNAL during this session by contributing to its pages or by expressing their ideas, recommendations or criticisms regarding it, or who have, in any way, taken an interest in the JOURNAL. They have made it possible for this year's Staff, in some measure, to fulfill its responsibilities for Volume XXVI—to every one of them, our sincere thanks.

To every student, every alumnus and every member of the Faculty, we would say "remember that next year, our JOURNAL must progress still further. It is up to you! We know you can do it!"

HUMANISM AND MEDICINE

H. B. VAN WYCK[1]

PART VI
HELLENIC HUMANISM

IN THE FIGURES of Thales, Pythagoras, Democritus, and Hippocrates, are typified the stages to which science, medicine, and philosophy had developed by the last quarter of the Fifth Century, B.C. To them and their bright-witted contemporaries, the day was at the spring, nature was an open book inviting an eager reader, and the vista ahead fired their souls with a confident flame. The galaxy of contemporary genius abroad included the tragedians Aechylus, Euripedes and Sophocles; the comedy writer Aristophanes, the poets Theocritus and Pindar, the historians Herodotus and Thycydides, sculptors, architects, statesmen, and three of the most gifted of the sons of men—Socrates, Plato and Aristotle.

One may imagine the emotions stirring the young Athenian at the première of the *Antigone* when the chorus recited the ecstatic eulogy of man's newly-found power over nature. "Of all strong beings, none is more wonderfully strong than man. He can cross the wintered seas, and year by year compel with his plough the tireless strength of Earth, the oldest of the immortal gods. . . . Language is his and wind-swift thought and city-founding mind. He has learned to shelter himself from cold and piercing rain; and he has devices to meet every ill, except Death alone. Even for desperate disease, he has a cure, and with his boundless skill he works on, sometimes to evil, but then again to good." A modern analogy would be the thrill of the audience when *Rule Britannia* was first sung. Here in the play Sophocles, was a paeon of praise to man who was to rule the universe—or so it seemed to the Greek who was conscious that he was leading mankind through a threshold to a new world of intellect. The world was young to these Athenians.

This exuberant optimism and enthusiasm did not find comparable expression again until "The Great Age of England," after the Armada, when one could have gone to the Globe Theatre with perhaps the author of the *Atlantis* in the audience and heard amidst the echoes of the Spanish galleons crashing on the surf-torn rocks of the outer Hebrides: ' What a piece of work is man! How noble in reason! How infinite in faculty. In form and moving, how express and admirable! In action how like an angel! In apprehension how like a god! The beauty of the world! The paragon of animals!" (*Hamlet*, Act II. Sc. 2.)

The world was young again in Shakespeare's day and after two thousand years in the words of *Hamlet* we hear the refrain of the great chorus of the *Antigone*.[12] The day when those harmonies are recaptured in the world's literature will be a happy one for our race. It may amuse the phantasy of an

[1]Head of the Department of Obstetrics and Gynecology.

[12]This arresting analogy is developed in Marvin's *The Living Past*, Oxford Press, Chapter VI.

imaginative reader to recall that in that première of the *Antigone* when the poet-dramatist boasts about the triumph of Athenian medicine, perhaps there was a doctor in the house, and that, when all eyes turned to Hippocrates, he may have risen and acknowledged the plaudits of his fellow citizens. Another picture comes to mind. When the chorus chant that Death alone has not been solved, perhaps a big and burly Athenian was sitting there with his *Xanthippe*—a sophist heretic, Socrates, who had thought much on death and life and had found at least in part one answer.

The Greeks who had together repelled the Persian invasion had now begun the fratricidal and exhausting Peleponesian Wars (430-400 B.C.) which proved to be the eventual suicide of the Golden Age. The sophists who had been the travelling teachers of Greek youth had begun to spread their rationalistic doctrines among the common people and there was hardly a problem of philosophy, religion or morals that provokes discussion today that they did not discuss. Unimpressed by taboos or faith in the traditional mythology of Greece, they questioned at the bar of reason all the established creeds and institutions. These disputations publicists were of two types as obtains among our teachers today; some were more desirous of displaying a nimble wit in proving a worse cause the better, but many not only were sincere in the search for truth, but zealous in its propagation. There were two schools of political thought; one held like Rousseau that the natural man is good and only civilization vile, that all men are born equal, but the unequalities develop through class-made institutions; the other taught that men are born into an unmoral universe, that power is the supreme value, and that aristocracy is the best form of government.

Among these sophists appeared Socrates, the most famous of philosophers, and about him flocked the youth of Athens. From his lips, they learned that the life of the spirit of man was at least as important as the nature of the physical world; and by this greatest of the humanists, the attention of his own and all subsequent ages was directed to the pursuit of the eternal values; justice, honour, morality, duty. To find the answers in the ancient polytheistic faith would have pleased the conservatives of Athens; to build a morality independently of the religious doctrines of his day, stamped him as a heretic and gave him death and immortality. Socrates believed in one god and in immortality. He taught that the good meant knowledge and that virtue was wisdom; that sin is error; that government based on wisdom, in giving greater scope to the individual without fruitless restriction of liberty, would call forth loyalty to the state and establish peace and good will to men. What then is wisdom and how can society be saved except by the rule of its wisest men?

Such opinion, reactionary to the democracy then paramount at Athens was held by demagogues of the time to portend a destruction of their ancient faith and a corruption of the youth who followed this strange iconoclast—this heretic and traitor. Then follows the familiar story of the trial and condemnation of the first martyr to die in defence of the freedom of the human mind. Condemned to drink the lethal hemlock, Socrates could have easily avoided his fate by the bribes freely offered by his friends or by his own recantation. He preferred death. "Be of good cheer," he told his grieving

disciples, "and say that you are burying my body only." The rest of the tale told by Plato in the *Apologia* takes its place among the greater charters of human liberty. In prose of noble simplicity and exquisite beauty, its pages reach the sublimity of the highest moments in the sacred writings of the higher religions.

The world's incalculable debt to Socrates was the discovery of conscience and its identity with the human soul; man became for the first time in history conscious of his own individual spiritual value and destiny. His great purpose was to make men honest; in his divine passion for honesty, he was a playful realist in the realm of a reasoned idealism. He turned the scale against a deterministic and material view of life; and, to those who hear his voice, forever rescued morality from chaos, philosophy from casuistry, and religious aspiration from fanaticism. His inspiration he called his daemonium, "a voice from heaven." One English critic has said that this daemonium of Socrates is a case for the pathologist. Not only is it unlikely that any pathologist could survive a cross-examination by Socrates; but that would be as futile "as to refer the genius of Shakespeare to a phrenologist or the broad sympathy of Wesley's soul to a man like Dr. Freud—of one idea and that a nasty one."[13] That such a life appeared against the social back-ground of the Greece of Socrates day, makes all the greater the miracle of his appearance.

The mass of men cared little for wisdom, morality, or the higher knowledge. Slavery was accepted without question. It is estimated that in the tiny domain of Attica, 250,000 slaves made possible the more privileged life of the 100,000 citizens. Women had a degraded place in domestic life and unnatural perversions were prevalent. Cruelty was rife and suffering universal and almost ignored. Unwanted female infants were exposed to death at birth. The cities, with open drains in the streets, were decimated at intervals by plagues brought from the pest ridden cities of the near East. In thinking of Greece of those days a competent authority writes: "we must imagine houses without drains, beds without sheets or springs, rooms as cold or as hot as the open air, only draughtier; meals that began and ended with pudding, and cities that could boast neither gentry nor millionaires. We must learn to tell the time without watches, to cross rivers without bridges and seas without a compass, to fasten our clothes (or rather two pieces of cloth) with two pins instead of a row of buttons, to wear our shoes or sandals without stockings, to warm ourselves over a pot of ashes, to judge open air plays or law suits on a cold winter's morning, to study poetry without books, geography without maps, and politics without newspapers."[14]

Moreover, during most of Socrates life, civil war was draining the Greek world of its material strength. It was in this turbulent and uncomfortable world that Socrates sought the good life, dignified the reason of man, and saw in the universe the design of a greater intelligence. A faith in human reason and common sense tempered by a mystic acknowledgement of the unseen and perhaps unknowable, a belief in a benevolent universe proceeding to a worthy end was the essence of Socrates, the supreme humanist whose character

[13]Gentleman with a Duster: *Seven Ages*. G. P. Putman, 1923.
[14]Alfred Zimmern: *The Greek Commonwealth*, Page 213.

and life forever a chart for the guidance of man.

He who was at hand to leave to us an account worthy of the tremendous theme was the martyr philosopher's greatest pupil, Plato, whose writings have preserved almost all that we know of Socrates.

Plato (427-347 B.C.), the founder of systematic philosophy, was endowed with one of the most fertile intellects that history records. Socrates sought to change human life by the control of conscience; Plato sought to change the world by a Utopian state. There is no field of philosophic thought which Plato has not illustrated and adorned. The teachings of Plato still influence the modern world. Whitehead has stated that modern European philosophy has been nothing more than footnotes to Plato; and certainly: (*a*) Plato's theory of the soul can never be forgotten by the modern psychologist; because it is able to interpret the findings of the scientific psychologist, the descriptive psychologist in terms of a moral not a mechanistic human creature and without confusing psychology and ethics;[15] and (*b*) Plato's doctrine of Ideas or Forms modified or perhaps we should say moulded the theology of Christianity and must be considered in an attempt to explain the elaborate super-structure of formal belief that has been reared upon the simpler record of the *New Testament*. Thus to all whose lives and way of thought have been fashioned by the culture of Western Europe—whether one is pagan, communist, Christian, Buddhist, or Mohammedan—the influences that fashioned Christianity should be, must be, if one is intelligent, a matter of supreme interest. A physician that cannot take a broad and comprehending view of his patients' religious or anti-religious convictions is as fatuous as he who would attempt to see with a stethoscope or listen with a speculum. This should be a basic principle of psychosomatic medicine.

Plato was Socrates' greatest pupil. Born in 427 B.C., he was 28 when the master died. The tragedy changed this young aristocrat into a zealot. Just as St. Paul, four centuries later, finding justification for the tragedy of the crucifixion in the sacrificial rites of Judaism, devoted his life to the propagation of his faith, so Plato was filled with a scorn of democracy and the resolve to spread a philosophy which should bring about the rule of the wisest and best. And thus he wrote a book. It is no acident that those who have become imbued with the missionary zeal to mould the world closer to their hearts' desire have turned to the pen rather than to the sword. The profound and lasting effects of these books attest the power of the written word—the Pauline letters which, by the Third century, brought the Mediterranean world face to face with a new and aggresive religion; *Le Contrat Social*, a statement of the natural rights of man from which the historian may date the French Revolution, the beginning of our present troubles; the *Koran* which from the Arabian desert threatened to impose on the Western world an uncongenial monotheism; *Das Kapital*, conceived in the dusty depths of the British Muesum and destined to give a gospel to a rival civilization; and *Mein Kampf* which brought the lure of specious hopes to a defeated and bitter people. In each of these, the programme has been corrupted and the influence vitiated whenever the pen has been discarded in favour of the sword. Plato, fired by benevolent enthusiasm for mankind

[15]Edison: University of Toronto Quarterly,1947. This paper could be read with great profit by every student before beginning psychiatry.

wrote *The Republic*, and this revolutionary work is at least guiltless of human blood.

After the death of Socrates, Plato, suspect to the demagogues who had killed his master, travelled widely throughout the known world and then returned to Athens in 387 B.C. And now began the Academy of Athens where Plato, now aged 40, taught and wrote for the next 40 years of his life. His life must have been a happy one. To his many pupils he was friend as well as philosopher and guide, and when he passed from the shadows of earth to his ideal realm, all Athens followed him to the grave.

In the dialogue, a form which he created, philosophy assumed a garb of brilliance and beauty never since surpassed. The best of the dialogues, *The Republic*, displays in an intoxicating mixture of poetry, science and art, the most important of our problems: communism, socialism, feminism, birth control, eugenics, morality, psychology, politics, education; and Plato anticipates in discussion the ideas of Rousseau, "The return of nature"; of Nietzche, "the will to power"; of Bergson, "the creative élan vital"; of Freud "the tripartite soul." In Plato's description of the soul, the student of medicine may find his greatest interest. Plato conceives of the self or soul as having three parts or functions— notin the mechanical sense that the three parts or functions are equal to a whole, but that the three parts are aspects of a unity which is greater than the parts; just as a picture is greater than the paint and canvas used in its production.

These parts or aspects are:

(*a*) The reasoning part

(*b*) The spirited or ambitious part (the nobler emotions)

(*c*) The desiring or appetitive part (the appetities or passions).

Plato points out that the part which knows course "A" to be right and good cannot be the same part which tempts us to course "B". For Plato, each part of the soul may predominate, and produce three types of individual—

(*a*) He who pursues wisdom (*philosophos*)

(*b*) He who pursues honour (*philotimes*)

(*c*) He who pursues wealth and sensual pleasure (*philocerdes*)

Plato thus accounts for three kinds of moral character. He is not concerned with the psychologists problem of specifying states of consciousness: cognition, affection, conation. The ethical values of conduct are his quest. Each part of the soul has its own appropriate desire. Now the reasoning or highest part of the soul desires the discovery of wisdom and truth and can coerce the other parts into proper subordination. And reason teaches the old lesson that lasting satisfactions are not found in passing appetities and desires. The soul reaches its highest excellence when the three parts are working in harmony with reason or *logos* in control. One must remember that *logos* meant originally a "word" and then "reason" because the Greeks believed that words meant something, and, as that meaning was precious the formal written word was treasured. They were not in our unhappy plight when each day a forest empire is squandered to spue forth the meaningless and often baleful pages of printed follies to a people to whom words mean anything but pure reason. One cannot but recall where the Gospel of St. John envisions the *logos*; yet today the *logos* is often just tonight's journal and tomorrow's wrapping paper.

There is an exciting anticipation of

Freud's subconscious constituent of the self in *The Republic* (Book IX):

"Of the unnecessary pleasures and desires, some seem to me to be unlawful. They are probably innate in every one, but if disciplined by law and by the better desires, with the assistance of reason, they may in some men be entirely eradicated, or at least left few and weak, while in other men they are stronger and more numerous."

"And what are those desires?" he asked. "Those that are active during sleep," I answered. "When the rest of the soul, the reasoning, gentle, and ruling part of it is asleep, then the bestial and savage part, when it has had its fill of food or wine, begins to leap about, pushes sleep aside and tries to go in such a state it will dare everything as though it were freed from all shame or discernment. In a word, it falls short of no extreme of folly or shamelessness."[16]

But whereas in Freud's view these lower desires determine conduct inexorably, Plato believes that when reason is in the driver's seat, these desires are under moral control. This concept assumes that man has freedom of choice and pictures him as a moral being, not the mechanistic creature of Freud. Now Plato asks how can the reasoning part achieve its special excellence? And the answer is—by the contemplation of the Forms.

And this brings us to the famous doctrine of the Ideas or Forms. To Plato this visible world was an imperfect copy of an ideal world and the ideal world was the world of reality. In the ideal world, heaven if you will, are the perfect forms of what we see on earth. Thus all red things were red because of the idea or form of redness manifested in them. The form or idea of Tom, Dick or Harry is "man"; or it might be the laws governing a thing (for example, the ideal or form of Tom might be the behaviour of Tom reduced to natural laws), or again, it might be the perfect purpose to which the thing might develop (for example, the perfect purpose to which Tom might develop). The Platonic idea or form is perhaps all of these—idea, law and ideal, or again a universal, a meaning and a destiny, and these forms are laid up in heaven.[17]

This doctrine is perhaps more easily understood in relation to abstract qualities. Plato's pre-eminent form is the Form of the Good, the ideal of which we see only approximations on earth. These perfect forms are the true reality and the approximations on earth. These perfect forms are the true reality and the reasoning part of man has achieved its highest wisdom in contemplation of these forms. This doctrine of the forms is so-called Platonic idealism. It transports the mind and soul to a Utopian and eternal realm, independent of time, place, and this fleeting world of actuality; and this ideal world of Plato was a concept congenial to the early church fathers who were to fashion the orthodoxy of Christianity.

It has been said that a philosopher, amateur or professional, is either a Platonist or an Aristotelian. The former, the Platonist, is apt to seek truth in an ideal world of his own instinctive construction; whereas, as we shall see, the Aristotelian is content first to know more about this world before embarking on adventures of speculation. There is a scope and use for both types, and, if the test tube is balanced by Wordsworth's *Intimations of Immortality*, life should be

[16]Translated by A. D. Lindsay.

[17]Will Durant, in *The Story of Philosophy*, presents a delightful account which treats of difficulties in Plato's writings with attractive clarity.

more abundant. This much should be demanded of both types of thinker—that each keep his feet firmly planted on this earth even though he attempt to pierce the clouds and strike the stars.

The greatest Platonist among the Christian theologians was St. Augustine. In the *City of God*, he describes the eccleastical and temporal Rome as only an imperfect copy of the City of God which is the Universal Church, that is, the ideal of perfection in Heaven. This dualism governed Europe for centuries—a magnificent obsession whether true or false, and a direct corollary of the Platonic doctrine of the Forms.

Does intuitive and imaginative thought contribute to man's wisdom? Where is the place of inspiration and revelation? Need one confine one's self only to observation and inductive reasoning? Can the intellect grasp meanings that are not based on experience? Is this the function called inspiration? Chesterton's definition of inspiration (he was thinking of the writer, naturally) was "to write better than you know."

Plato's doctrine of the Ideas and Forms is one of those examples of inspired revelation—a vision no doubt in part, but nevertheless a vision of truth—and one illustration may suffice. Perhaps when one contemplates the inspired beauty of some of the great moments of literature or music, one is receiving a vision of the supreme form of beauty and experiencing something eternal and real. The form of beauty in a Beethovan quartet may be more real than the strings which are plucked or the players who draw their bows. This experience is perhaps the same in kind with that of the religious mystic; but, whether one agrees or not with Plato's vision, the doctrines of the soul and of the ideal forms it must contemplate, will continue to oppose the mechanist and the materialist; and the perfect state that Plato envisages with three classes corresponding to the three parts of the soul, will be ruled by philosopher kings who will gain wisdom by contemplation of the supreme forms of beauty and goodness. Plato was also a realist. He did not share the confident optimism of the religion which embraced him as a secondary sponsor.

"Meanwhile in heaven, there is laid up a pattern of such a city and he who desires may behold it and beholding may govern himself accordingly. But whether there really is or ever will be such a city on earth . . . . . he will act according to the laws of that city, and no others."[18]

Frustrated idealism yoked to realistic precept; the just and virtuous man will apply even in the imperfect state, the law. Has there ever been written a better programme for citizenship? "Morality," said Jesus, "is kindness to the weak." "Morality," said Nietzche, "is the bravery of the strong." "'Morality," said Plato, "is the effective harmony of the whole self under the control of reason."[19] Which may one hold to be the fundamental element?

Plato's most famous pupil was Aristotle, born at Stagira in 384 B.C. He studied with Plato for perhaps twenty years and then became the tutor of a wild youth of thirteen, soon to become Alexander the Great, master of the known world. Alexander attempted the conquest of the political realm and Aristotle the philosophical realm, two tremendous Macedonians attempting to unify two chaotic worlds. When Alexander set out to conquer Asia, Aristotle returned to Athens and, in 334 B.C. established his school—the

[18]*The Republic*, 592. (A translation quoted by Will Durant.)
[19]Will Durant: *The Story of Philosophy*, page 39.

Lyceum. And now began to pour out the remarkable succession of works in research and speculation. The contrast between Plato and Aristotle is revealed in every splendid page. Whereas Plato neglected observation and reared his ideal world by deduction, Aristotle decided to confine his interests to hard, stubborn facts, and became the world's first great inductive reasoner. Both were realists in the sense that they sought reality in generalizations; but Plato's mystical flights into the empyrean left Aristotle still grounded. Of the doctrine of the Forms, Aristotle was interested only in the sense in which the Form meant purpose or end. Why did the acorn become the oak tree if not that life had fulfilled a purpose or end

If Aristotle had had the data of Darwin (and he began bravely to gather such) he would have established a teleological concept of evolution rather than a mechanistic one. For, to Aristotle, the teleological cause of change was the most important.

Many of the works of Aristotle have been lost, but enough remains to stagger the imagination. He sought for increased knowledge of every known subject as yet of interest to man. His writings are numbered by the hundreds; *Logic*, *Physics*, *The Heavens*, *Growth and Decay*, *Anatomy of Animals*, *Plants*, *Rhetoric*, *The Poets*, *Politics*, *Ethics*, *Metaphysics* attest the catholicity of his interest. Here is the first encyclopedia, a classification ,record, and synthesis of knowledge never so succesfully achieved again until our day. Truly an adequate procession to the degree awarded by the centuries—the Philosopher. In *Logic* was produced a magnificient instrument of thought; in *Ethics* the doctrine of the golden mean may still chasten the fanatic; the theories of esthetics found in the *Poetics* still seem fundamental to the artist; the importance of classification to science had its early recognition in the works on biology; and Aristotle's teleological concept of organic and spiritual life has in our time returned to restore dignity to man's place in evolution. A conservative in politics, a monotheist in his metaphysico-religious views; a scientist with a bent for observation, Aristotle has given perhaps more to the world than any of his successors for a thousand years; and, until the impetus given by the more objective study of nature in the works of Occam, Roger and Francis Bacon, this great mind divided with Socrates and Plato the intellectual rule of man. Here was the first of the world's great biologists, the first embryologist, the creator of logic, the first classifier in natural history and the first systematic observer and inductive reasoner. Is it any wonder that no other man of science has exercised so great an influence for so long a time?

The literature, scientific and humanistic, of the Western world has flowered and born fruit an hundred fold because Western man's garden of letters was largely seeded by these two, Plato and Aristotle, the greatest of glorious, ancient Greece.

The cultural debt of the Western world to the Hellenic peoples includes the works of the dramatists, the historians, the poets, the orators, and the plastic artists in addition to those of the scientists and philosophers. In material things, the Greeks of the Great Age made little advance, but intellectually they reached heights few other races have attained. The systematic approach to knowledge was their creation; their view of life embodying a burning devotion to truth and beauty, gave a lasting tradition of intellectual freedom, tolerance, and urbanity to the world.

ABSTRACTS

BACTERIOLOGY

Morphologic Characteristics of Certain Cultured Strains of Oral Spirochetes and Treponema pallidum as Revealed by the Electron Microscope. E. G. Hampp, David B. Scott, R. W. G. Wyckoff: J. Bact. **56**, 755-769 (1948).

The electron microscope has been used to demonstrate controversial structures among the members of the genera *Treponema* and *Borrelia*. An account is given of the general morphology and surface structure and a number of excellent microphotographs are included. The presence of flagella on the various spirochetes is shown; and internal, end and external granules are described and illustrated. In early stages, the external granules are found intimately associated with the organisms but later, they are shed and found free in the surrounding culture medium.

Miss J. E. Wood

GYNECOLOGY

The Association of Breast and Pelvic Disease. V. K. Pierce and D. P. Slaughter: Cancer **1**, 468-471 (Sept. 1948).

The obvious functional relationship between the female breast and reproductive organs led these workers to institute a study to determine whether women with lesions of the breast had a higher incidence of pelvic pathology than average women. The gynecological status was determined in 100 unselected cases of women presenting themselves with various types of breast disease; 63 with mammary carcinoma in different stages and 37 with benign breast lesions.

The gynecological examination included a detailed history, complete pelvic examination, endometrial biopsy and vaginal smear. Lesions of a minor or temporary nature were excluded from the survey; patients with past histories of menstrual irregularity, sterility and retroversions alone were excluded as were patients with unassociated or temporary inflammations such as salpingitis or trichomonas vaginitis and obstetrical complications such as retroversions, cystocele, rectocele and lacerations.

Eighty-three of these hundred patients were found to have had or to have pelvic disorders of significance: cervical erosions, kraurosis vulvae, fibroids, cervical polyps, Bartholin cysts, procidentia, carcinoma of the cervix, corpus uteri or ovary. The incidence of pelvic disease in this group was almost four times that of well women of comparable age. Patients with benign breast lesions had more than twice as many lesions of the pelvic organs as had those patients with malignant breast disease. 33% of these women, receiving stilbesterol for their breast disorders, exhibited post-menopausal estrogen activity as ascertained by vaginal smears. The authors point out the possibility of a common etiological factor and indicate the importance of thorough pelvic investigation of all women with breast lesions, both benign and malignant.

M. G. Wolfish

NEUROLOGY

Stimulation of the Nucleoprotein Production in the Nerve Cells by Malononitrile and Its Effect on Psychic Functions in Mental Disorders. H. Hyden and H. Hartelius: Acta Psychiatrica et Neurologica, Supp. 58, Lund, 1948. 117 pp.

The nerve cell possesses a capacity for intense protein production; and following sensory and motor stimulation, the protein and nucleotide content undergo extensive catabolism followed by restitution. This study demonstrates the effect of malononitrile on the nucleoprotein metabolism in the ganglion cells of the central nervous system. Experimentally, 3 - 4 mgm. per kg. body weight of malononitrile administered intravenously in rabbits was found to increase the amount of the ribose type of nucleic acid by an average of 1.7 - 3.1% while the ratio of nucleic acids to protein substances changed from 1: 7 to 1: 35. It was then determined that the amount of polynucleotides and protein substance in the pyramidal cells of the frontal cortex of eleven psychotics was considerably less than that from the same cells of four normal human subjects, 3 to 5 hours after accidental death. To increase the nucleoprotein metabolism of psychotics, malononitrile was given intravenously to 66 psychiatric patients in doses of 3 - 6 mg. per kg. body weight. Treatments were given twice weekly and varied in

number from 6 to 10. Lasting improvement was obtained in 24 cases, transitory improvement in 12, no improvement in 18 and a deterioration of condition in 1 patient. This report suggests that psychic functions are correlated with the nucleo-protein metabolism of nerve cells.

A. C. Parkin

PEDIATRICS

Results of Therapy of Erythroblastosis with Exchange Transfusion. I. S. Wiener and I. B. Wexler: Blood **4**, 1-35 (Jan. 1949)

The results in 28 cases of erythroblastosis fetalis treated with exchange transfusion are presented and the rationale of this type of therapy is outlined. The Rh-positive erythroblastotic baby is thought to be born with its red cells coated with "univalent" Rh-antibodies derived from the mother during intrauterine life by transplacental filtration; these antibodies cause hemolysis or clumping of the infant's red cells. If only hemolysis occurs, hemolytic anemia results, which responds to simple transfusion with Rh-negative blood. If intravascular clumping takes place, the circulation to vital organs is impaired producing the picture of icterus gravis with possible death of the infant and post-mortem findings of jaundice and hepatic necrosis. It is thought that intravascular clumping rarely occurs *in utero* but that with the birth of the infant, the conglutinin content of the fetal plasma may rise to a concentration sufficient to cause clumping of the red cells. Simple transfusion is of little benefit because it cannot reverse the process of clumping, but if, during the early stages of the disease, the infant's blood is drained off and simultaneously replaced with type rh-blood of a compatible blood group, it is likely that the disease will become aborted, because type rh-blood cells cannot be clumped by the Rh-antibodies in the baby's blood.

In the authors' technique of exchange transfusion, 500 cc. of citrated blood are introduced into the saphenous vein at the ankle and the infant's blood is simultaneously withdrawn from the radial artery at the wrist, coagulation being prevented by the administration of small amounts of heparin. An 87% blood replacement is achieved. Of the 28 cases presented, 16 were very severe and probably would have terminated fatally if left untreated, 6 were of moderate severity and 6 were mild. Only 7 of the infants died and the authors feel that the mortality would have been at least twice as high had the usual treatment with simple transfusion been given. All the surviving infants have developed normally both physically and mentally and have shown no sequelae of liver or brain damage. Recently, the authors have modified their technique by using 1000 cc. of blood and thus achieving a 98% blood replacement but as yet the results of this procedure have not been published.

G. L. Ralph

PHARMACOLOGY

Toxic Effects of Tridiones. J. N. Briggs and J. L. Emery: Lancet **256**, 59-62 (Jan. 1949)

A brief resume of the literature on tridione is given with the emphasis on toxic manifestations. Ten cases of petit mal treated with tridione are reported. The ages of the patients varied from 6 to 13 years. Three cases showed no therapeutic response after 2 months and the drug was discontinued. Two cases became free from petit mal attacks after 5 and 14 months of treatment and there was no recurrence after stopping the drug. One case showed a good response after an urticarial response at 3 weeks was controlled by benadryl. Three cases developed neutropenia at ½, 11 and 13 months, respectively. These cases all recovered following withdrawal of therapy. A nephrotic syndrome appeared after 4 months treatment in the one fatal case. This condition was believed related to drug toxicity but no explanation could be advanced. The toxic neutropenia is believed due to the action of a pentagonal ring structure resembling aminopyrine. The conclusion reached from this series of cases was that the toxic complications of tridione did not justify its therapeutic efficiency.

T. A. McLennan

SURGERY

Portocaval Shunts in the Treatment of Portal Hypertension. Linton, Hardy and Volwiler: Surg. Gyn. Obs. **87**, 129-144 (Aug. 1948).

Portal hypertension may be the result of intrahepatic obstruction of the portal vein, as in cirrhosis, and/or extrahepatic obstruction, as in the Banti syndrome with fibrosis of the

portal vein. The differentiation is based on the degree of integrity of liver function. The methods of dealing with this disorder are described. The early, end-to-side anastomosis of the splenic and left renal veins by a direct suture method, coupled with splenectomy, is preferred and the outcome in the series of fifteen cases described seems to bear this preference out. The Eck fistula operation used in experimental work damages liver function, and in addition, the operation is technically difficult because of the extreme vascularity of the portal area. Advantages of the end-to-side operation are: (1) production of only a partial shunt, (2) lowering of hypertension, (3) splenectomy reducing inflow by 40%, (4) division of many collateral channels feeding varices, (5) technically easier operation, (6) the end-to-side method preserves the kidney and avoids thrombosis. Results in extrahepatic block were satisfactory in 85%, those with intrahepatic block were less satisfactory because of the generally poor condition of the patients, but those who survive the immediate effects, have done well.

Miss A. I. Scott

Henderson's

MATERIA MEDICA

NEW EDITION, completely revised and enlarged, by J. K. W. Ferguson, and G. H. W. Lucas, Department of Pharmacology, University of Toronto. $4.75.

Drugs from both the British Pharmacopoeia and the United States Pharmacopoeia are included in this volume, in such a manner that rapid comparisons may be made between British and American terminology. The text is also written on the basis that medical students will be taught to write prescriptions in English instead of Latin—a decision made by the Faculty of Medicine of the University of Toronto in 1947.

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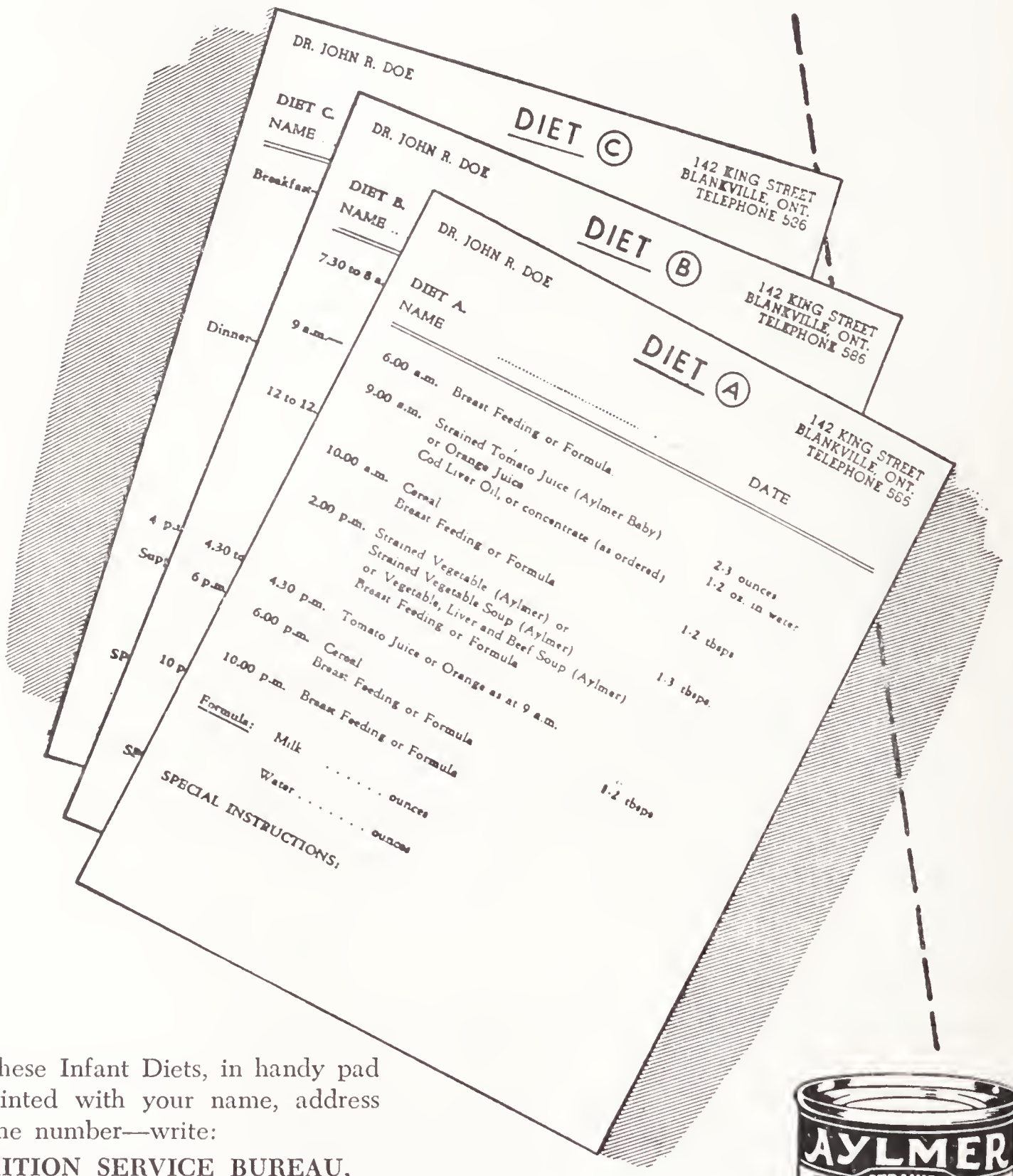

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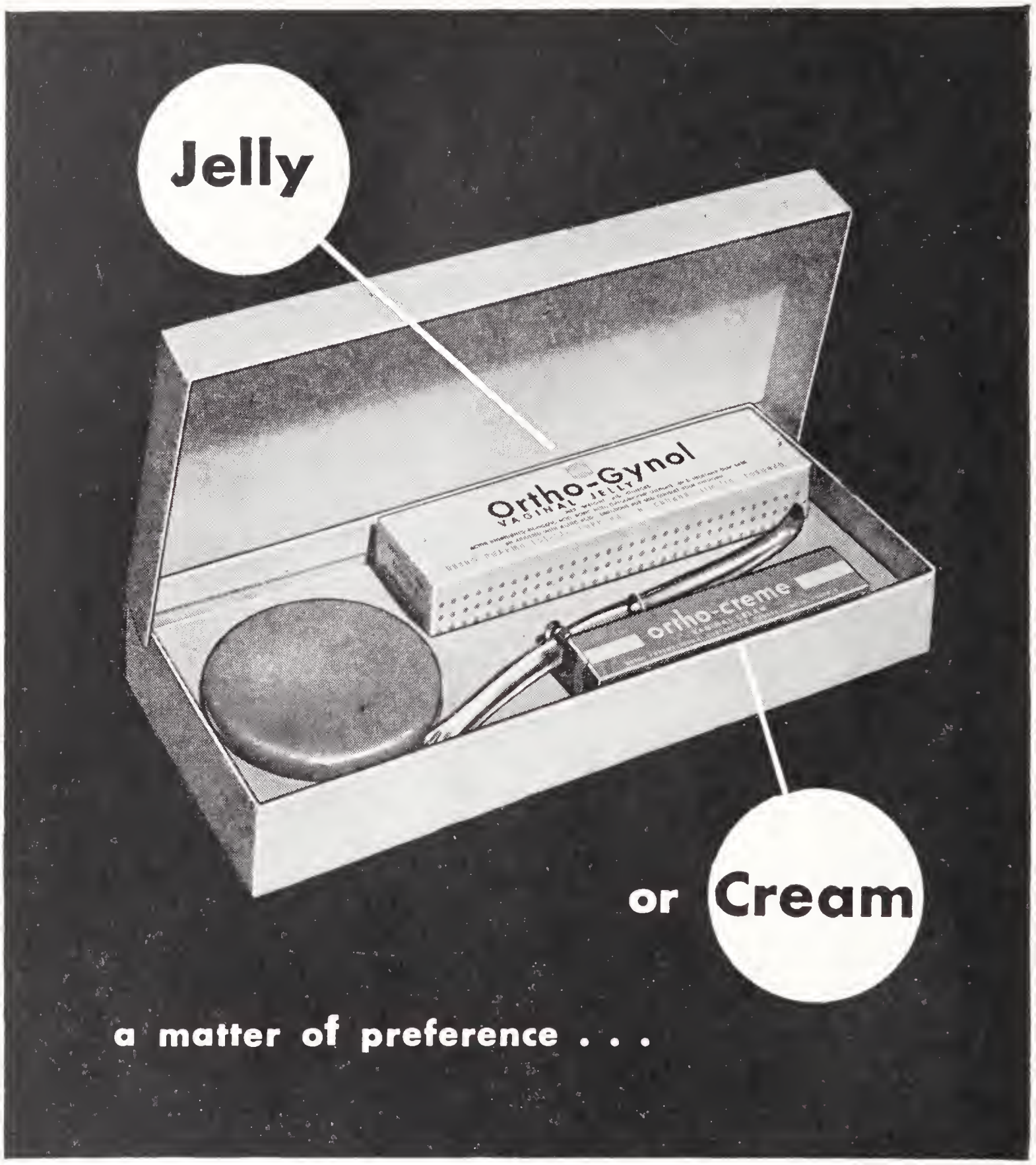

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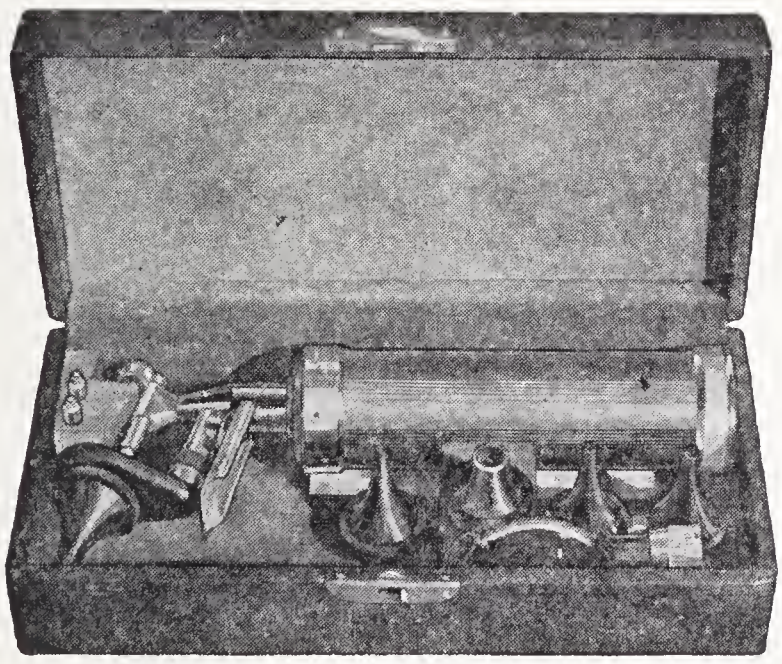

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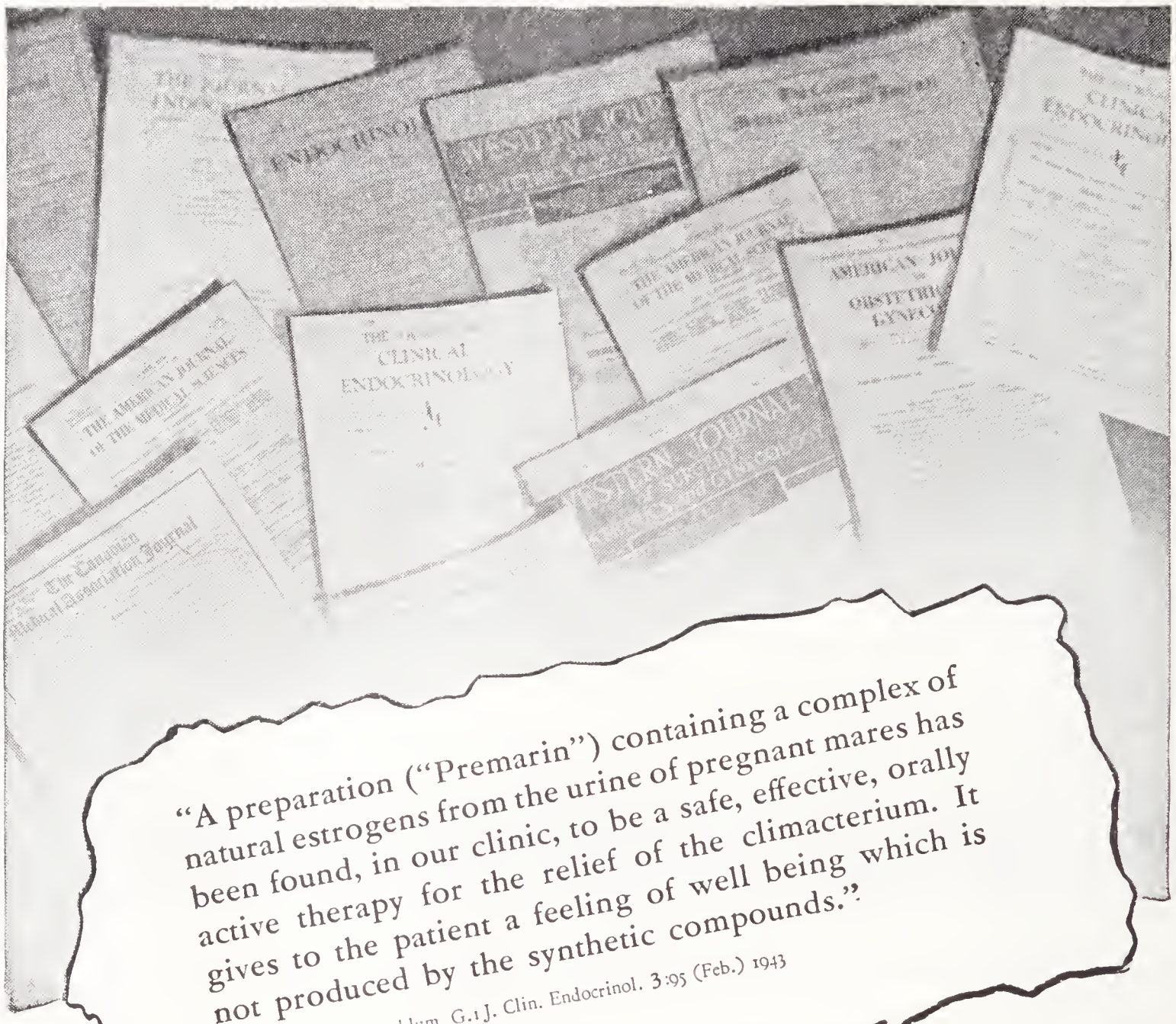
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